

THE LEATHER WORKER'S MANUAL

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PREFACE.

It is not intended in the following pages to teach tanners how to convert green hides into leather, neither is it intended to teach curriers how to dress or finish any kind of leather. Such instructions must be sought for in some manual that especially treats of tanning and currying. What this book is intended to impart, however, is particulars concerning the method of preparing and using the various currying, dyeing and finishing compounds for leather, the methods of making blackings, polishes and other renovating compounds for boot, shoe and harness leathers, the methods of preparing and using dye liquors for colouring leathers, the preparation of the materials in use by boot finishers, etc. At first sight the purport of this book may not be very apparent: a few words, however, will explain its *raison d'être*. Some five or six years ago I sent an article giving instructions how to dye leather brown to the editor of one of our English leather trade periodicals, and that editor, acknowledging receipt and acceptance of the article for publication, incidentally remarked that a very decent living was to be

obtained by any one who could supply curriers and leather workers with practical working formulæ concerning the materials used in the trade. This idea the writer at once seized on, and by means of a small advertisement in the leather trade journal, proved the truth of the editor's observations during the following twelve months—so much so that curriers, tanners and leather workers from all the four quarters of the globe sought the writer's advice. The fact that many of these correspondents have asked again and again for advice, proves that their wants were met time and again. As the leather industry is so varied in its operations, it is impossible for a currier or leather dresser to be intimately acquainted with the production of every kind of leather; in fact, like every other commercial industry, there are specialists in every branch.

Now, as these specialists at some time or another want to know something about the dressing and finishing of leather of which they have not made a special study, they have sought the writer's aid. Others again who want to improve on their own operative methods seek for information on some special point, while yet again others who want to start manufacturing the several kinds of blackings, dressings, polishes, etc., used in the boot, harness and leather trades, have sought the information they want at the writer's hands. So many, in fact, have their inquiries been during the past five years that the writer is convinced that what information is conveyed

in the following pages will be welcomed by many. Among the recipes for blackings, etc., will be found the formulæ of several well-known brands of blackings, creams, russet dressings, etc., now on the market, while in the currying compounds instructions for dyeing and staining will be found—instructions which have been put in practical operation in more than one branch of the leather industry. In all of the formulæ it has been the writer's endeavour to so convey instruction that the least scientifically educated, or most ordinarily educated operative, can comprehend the instructions. At the same time only such formulæ are given as can be relied on for the purposes specified. It would be out of place in a book of this description to attempt to instruct curriers and others in their craft, therefore no apology is needed for the absence of any such instructions, but as the heading of each recipe, formula, etc., clearly indicates the purposes for which it is designed, the operative can readily select the particular information he is in want of. With each recipe full working instructions are given.

In Chapters I. and II. are given instructions for preparing all kinds of boot and harness blackings, polishes, glosses, dressings, etc., which the would-be manufacturer of such articles will find to meet all his wants.

In Chapter III. all the articles usually retailed from the leather grinding warehouse or leather factor will be found.

Chapter IV. gives instructions suited to the currier and leather dresser concerning the seasonings, blackings, sizes and other materials he uses in his manipulations.

In Chapter V. the leather dyer will find instructions and recipes for staining and dyeing tanned and tawed leather, wool mats, etc.

Chapter VI. gives an account of Chrome Tannage.

Chapter VII. comprises a collection of miscellaneous formulae and processes which are suited to leather workers in many branches. The methods of preparing and using the compounds are given, so that those who seek shall not be disappointed with the sought-for information.

Trusting that this book will fill the niche in the small amount of published matter pertaining to the leather industry, the author commits the book to the consideration of his readers.

H. C. S.

1st August, 1899.

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CHAPTER I.

BOOT AND SHOE BLACKINGS, POLISHES, GLOSSES, DRESSINGS, RENOVATORS, ETC.

IN the following recipes and formulæ will be found working instructions for preparing many well-known kinds of boot blackings, polishes and creams, and the variety of recipes give products that are suited for every kind of boot and shoe leathers, from the cheapest "Northampton" kip to the highest class of ladies and children's boots and shoes.

The qualities of the several products vary so much, and yet "overlap" each other, so to speak, that it is not easy to classify them into definitely distinct classes, but as far as possible the recipes have been grouped roughly into classes which bear a resemblance in cheapness of cost and nature of compounds, while each recipe is headed with a description of the purpose for which the product is best suited; for, of course, a polish, gloss or cream that is suited for one special kind of leather is not always suited for other kinds of leather as well; therefore the would-be manufacturer who wishes to produce an article of a special kind will be best served by selecting several formulæ for trial and choosing that which suits him best.

BOOT BLACKINGS, POLISHES AND CREAMS.

Owing to the many varieties of leather now used in making boots and shoes, there is an equally great diversity in the nature and composition of the blacking or polish required for renovating same; thus, for example, a blacking to be

polished by brushing that is suited for common calf or crup leather is not well suited for the expensive glacé, kid leather. Again, those renovating compounds that are laid on the leather with a sponge are not suited for one and all alike. French calf (dull kid), such as the uppers of gentlemen's boots are made of, requires a different compound to what satin calf, Dongola, Memel or Cordova leather requires. So likewise those renovating compounds that are self-shining, and only require to be laid on with sponge or brush and leave a brilliantly polished surface, differ according to whether the leather is "patent," enamelled or glacé. To prevent confusion the formulæ are divided into various classes, viz. :—

Common boot blackings.

Paste and liquid to be polished by brushing.

Blackening compounds for ladies and children's boots.

Renovating compounds for special leathers of boots and shoes.

Miscellaneous blackings, dressings, polishes, renovators, etc.

COMMON BOOT BLACKINGS.

The ingredients of these compounds are subjected to a preliminary mixing, and then the mixture is put through a mixing mill, either an edge runner (for large quantities) or a hand mill similar to a paint mixer.

The common qualities of paste blackings are made with lamp or carbon blacks, but the better qualities are made with bone-black, because on treating this animal black with sulphuric acid, the phosphate and carbonate of lime it contains are converted into sulphate of lime, and during this action the black pigment swells up (intumesces) considerably, and thereby becomes very finely divided, and thus gives a better polish when submitted to the friction of brushing.

The sulphuric acid also reacts with the oil and treacle used and chars them, thus leading to the production of carbon

that assists in the colouring and polishing properties of the blacking. The black component of the blacking—whether it be animal (bone), or vegetable (lamp-black), or mineral (from the smoke of hydrocarbon oils)—is the polishing ingredient, but to cause these components to adhere to the leather, it is necessary to make use of some suitable agglutinant that will cause the black solid matter to adhere to the leather in the state of a thin coating. Hard drying agglutinants like glue are not suitable, gum-arabic under certain conditions may be used, but for common blackings that article is too expensive, therefore treacle or sugar are made use of, and a little glycerine is sometimes used so as to keep the mixture moist and prevent it drying up.

In addition to the above ingredients, an admixture of oil of a non-drying nature, such as sperm, seal, cod-liver, or even lard is used; oils obtained from the distillation of rosin, and petroleum and paraffin oils of all kinds although they do not readily dry, are not fit for use in blacking making.

Formula No. 1. Paste Blacking.

Ingredients.—Bone-black.

Glucose.

Sulphuric acid.

Sperm oil.

Carbonate of soda.

Water.

(Sugar may replace the glucose.)

Method of Preparation.—Dissolve the sugar or glucose in sufficient water to form a syrup. Take 5 lb. of this syrup and mix it with 5 lb. of bone-black in a vessel that will not be affected by acid, add 2½ lb. sulphuric acid, and stir the mixture until homogeneous and it exhibits a shining surface when it rests undisturbed. Separately dissolve 1 lb. of carbonate of soda crystals in just sufficient water to dissolve

them, and then boil the lye thus made with 10 lb. of sperm oil. Stir the whole time until the whole forms a thick liquid; then stir in the bone-black and glucose and mix well by stirring or putting through a mill.

The blacking is ready for putting in tins, boxes, or forming into cakes.

The consistence can be varied by altering the proportions of the oil and bone-black.

Formula No. 2. Fluid Blacking.

Ingredients.—10 lb. bone-black or ivory-black.

10 lb. treacle.

1 quart olive oil.

10 oz. gum-arabic.

5 gallons of water.

2½ lb. oil of vitriol.

Method of Preparation.—Mix the oil of vitriol and the bone-black, separately dissolve the gum-arabic in the water, and then dissolve therein the treacle, and mix this compound with the bone-black; finally stir in the oil and compound well by putting the mixture through a mill.

Another way of incorporating the oil of vitriol is to dissolve the gum in about its own weight of water, and then mix them with the oil to form an emulsion, and add this emulsified oil last of all to the mixture of the other ingredients.

Formula No. 3. Paste Blacking.

Ingredients.—10 lb. bone-black.

2½ lb. sulphuric acid.

1 fluid pint cod-liver oil.

2 lb. treacle.

2½ oz. Prussian blue, powdered.

stale beer, q. s.

Method of Preparation.—Mix the acid with the bone-black and well stir the mixture, then put in the treacle and well incorporate that body, and finally reduce to a suitable consistency with beer; vinegar may be used instead of beer, but there is no advantage in adding vinegar unless a salt of iron is used as a component of the blacking. The Prussian blue increases the richness or depth of the black. It should be mixed with the bone-black by sifting it therewith.

Formula No. 4. Fluid Blacking.

Ingredients.—7 lb. bone-black.

7 lb. treacle.

$\frac{1}{2}$ gallon boiling water.

42 oz. oil of vitriol.

1 pint of fish oil.

stale beer or vinegar, q. s.

Method of Preparation.—Mix the bone-black, treacle and water, then add the acid and allow it some hours to rest, then mix in the oil, and if required reduce to the desired consistency with beer or vinegar.

Formula No. 5. Paste Blacking.

Ingredients.—Bone-black.

Neatsfoot oil.

Brown sugar, or molasses.

Vinegar.

Sulphuric acid.

Method of Preparation.—Mix equal weights of bone-black and sugar, and then take sufficient neatsfoot oil to produce a stiff paste, separately mix 3 pints of vinegar with 1 oz. sulphuric acid and add as much of this mixture to the black compound as will reduce it to the required consistency.

Formula No. 6. Paste Blacking.

Ingredients.—10 lb. animal black.

2½ lb. sulphuric acid.

1 quart of fish or rape oil.

strong solution of soda.

5 lb. treacle.

1 to 2 quarts of a solution of gelatine and glycerine.

Method of Preparation.—Mix the animal black and acid together until free from lumps, and leave the mixture for ten or twelve hours, then add the oil and well stir the mixture until the oil has become incorporated, then neutralise the acid by slowly stirring in the soda solution, and continue stirring till the mixture ceases to froth or intumescence, then put in the treacle and finally add the solution of gelatine and glycerine; mixing more or less of this solution according to whether the blacking is to be paste or fluid. The solution of gelatine and glycerine is made by dissolving best cabinet-makers' glue, 1 part in 4 parts of hot water, and then adding to every 40 oz. of this solution 1½ oz. of glycerine. This compound gives a brilliant polish, but unfortunately owing to the presence of the gelatine and glycerine it is very easily affected by damp, and becomes mildewed when covered up in tin boxes. It is best put up for sale in oilskins or cake form.

Formula No. 7. Paste Blacking.

Ingredients.—84 lb. bone-black.

56 lb. treacle.

7 lb. linseed oil.

5 lb. oil of vitriol (sulphuric acid).

water, q. s.

Method of Preparation.—Mix the vitriol with the bone-black, and in twelve hours' time grind up into the treacle and

a little water, and then incorporate the oil and reduce to desired consistency with water. The use of acid in blacking tends to rot the leather; in the following two formulæ however a most excellent product is obtained without the aid of acid.

Formula No. 8. Gutta-percha Blacking.

Ingredients.—60 lb. of glucose syrup.

18 lb. lamp-black or carbon-black.

3 lb. bone-black.

3 lb. gutta-percha.

5 lb. olive oil.

1 lb. stearin.

35 oz. gum-arabic.

96 oz. water.

Method of Preparation.—First dissolve the gutta-percha by cutting it up into small pieces and heating it in a suitable vessel over a fire, and when nearly melted stir in gradually the olive oil, and when the mixture is entirely fluid add the stearin. Separately put the glucose syrup into another boiler, add the lamp or carbon-black, and also the bone-black, and mix well together. In a separate vessel dissolve the gum in the water, and if desired to perfume the mass a suitable essential oil, as of lavender, cloves, cinnamon, etc., may be added, the quantity of same required being dependent on the pungency of the scent.

To compound this mixture gradually stir the gutta-percha mixture into the mixture of lamp-black and syrup, the mixture being made warm, and when well incorporated add the gum solution and mix well. This blacking is diluted with three to four pints of water for use.

Liquid Blackings are usually composed of bone-black, sperm or other fish oil, sugar or treacle, sulphuric acid and vinegar, the latter fluid being the thinning medium. The following formulæ are typical of these liquid blackings:—

Formula No. 9.

Ingredients.—4 pints vinegar.
4 pints beer lees.
sulphuric acid.
5 lb. bone-black.
4 lb. treacle.
12 lb. olive oil.

Mix the oil with the bone-black until of an homogeneous consistency, then add the sugar or treacle and a little vinegar so as to enable the whole to be well incorporated, then add sufficient sulphuric acid to cause the whole to intumesce on stirring, leave the mixture for several hours until it has thickened, and when all effervescence has subsided, but the mixture is not yet cold, add the vinegar and beer (in the order named) and well stir the whole until thorough incorporation of the ingredients results.

Formula No. 10.

Ingredients.—14 lb. animal charcoal.
1½ lb. sperm oil.
1½ gallons of vinegar.
1½ gallons of sour beer.

(The vinegar may be omitted and double the quantity of sour beer used.)

Method of preparation same as in last recipe.

Formula No. 11.

Ingredients.—8 lb. bone-black.
1 lb. olive oil.
4 lb. sulphuric acid.
water, q. s.

Prepare as in last recipe, adding sufficient water to reduce the mixture to a fluid condition.

Superior Blacking Compounds and Dressings for Patent Leathers.

Ingredients.—8 lb. gum-arabic.

2 lb. treacle.

$\frac{1}{2}$ pints good black ink (from gall and iron).

16 fluid oz. vinegar.

16 to 20 fluid oz. methylated spirit.

Method of Preparation.—Crush up the gum and dissolve it in the ink, then add the treacle, and afterwards stir in the vinegar. Mix well and allow to settle, or else strain it and then add the spirit. An aqueous solution of soluble aniline black will give a superior black to what the ink does.

A *Special Dressing* for dancing and dress shoes (glacé leather) is prepared from the following:—

Ingredients.—3 doz. eggs, white of.

2 $\frac{1}{2}$ fluid oz. methylated spirit.

1 lb. raw brown sugar.

bone-black or lamp-black, q. s.

Method of Preparation.—Mix the spirit and white of the eggs together, then dissolve the sugar in the fluid, and finally stir the colouring matter into the mass sufficient to give the desired consistency, so as to enable the blacking to be laid on with a sponge.

A Special Liquid Blacking for High-class Boot Leathers.

Ingredients.—6 gallons methylated spirit.

6 oz. nigrosine water soluble.

7 $\frac{1}{2}$ oz. Bismarck brown B.

2 lb. camphor.

4 lb. Venice turpentine.

7 lb. shellac.

8 oz. benzine.

15 fluid oz. castor oil.

7 fluid oz. boiled linseed oil.

Method of Preparation.—Dissolve the nigrosine and Bismarck brown in 2 gallons of the methylated spirit, and then with the remainder of the spirit in a separate vessel dissolve the camphor, Venice turpentine and shellac, and in the mixture stir the castor and boiled oils, then mix this liquid with the coloured spirit, and after well incorporating by stirring, the blacking is ready for use. Lay on with a sponge. Another method is to digest the aniline colour in the spirit for some hours with agitation, then draw off the clear fluid or filter it; one gallon of the coloured spirit is mixed with four gallons of methylated spirit and there are added:—

2½ lb. camphor.

4 lb. Venice turpentine.

7½ lb. shellac.

Separately 1 gallon benzine is mixed with 13 fluid oz. castor oil and 7 fluid oz. boiled linseed oil.

Then this fluid is added to the methylated spirit compound. The above blacking is in the nature of a lacquer and is self-shining; it is useful for all leathers that are of a stout texture, but the shellac makes them brittle. The addition of the camphor, however, lessens this brittleness, and so likewise does the Venice turpentine. The gloss (for it is better so described as such than a blacking) is not very well adapted for the light leathers of ladies' high-class boots, because the gloss is waterproof, and a few accumulated layers of it clog up the pores of the leather and cause the latter to lose its elasticity and become harsh and crack.

A more Suitable Gloss for Glace Leathers is this:—

Ingredients.—9 pints methylated spirit.

2½ lb. shellac.

5 oz. Marseilles s. up.

8 fluid oz. glycerine.

1 oz. nigrosine.

• *Method of Preparation.*—This compound is prepared by making three separate mixtures and then mixing the whole together thus:—

• Put the shellac into a stone jar or bottle, and pour on it $\frac{5}{8}$ pints of the spirit, and stand this vessel in a warm corner, so that the shellac can dissolve by slow digestion, giving the mixture an occasional shake or stir up. In a separate vessel put the soap, and pour on it $2\frac{1}{2}$ pints of the spirit, and stand the vessel in a warm place so that the soap dissolves, and when dissolved mix in the glycerine. In a third vessel digest the nigrosine in the remainder of the spirit. When these several mixtures are ready for use, first make them all hot, and then mix the soap and glycerine solution with the shellac solution, and afterwards add the spirituous solution of nigrosine and well shake the whole mixture, and then leave it undisturbed for two or three weeks, when it will be ready for use. The above gloss is laid on with a sponge, and it dries almost at once. In cold weather it may require to be warmed before use.

A Blacking that Restores the Surface of Calf roughened by wear is prepared as follows:—

Ingredients.— $1\frac{1}{2}$ gallons methylated spirit.

1 lb. shellac.

3 oz. camphor.

4 oz. lamp-black.

Method of Preparation.—Dissolve the camphor in the spirit, then dissolve therein the shellac, and when that has dissolved stir in the lamp-black.

The following *Liquid Blacking* is for *Ladies and Children's Boots and Shoes*, and is usually applied by means of a piece of sponge:—

Ingredients.—1 gallon vinegar.

20 oz. (by weight) sulphuric acid.

48 oz. bone-black.

32 oz. treacle.

1 oz. gum-arabic dissolved in hot water, q. s.

1 oz. india-rubber cut up in shreds and dissolved in
 $\frac{1}{2}$ pint of hot olive oil.

Method of Preparation.—Mix the bone-black with the sulphuric acid and leave it twelve hours, then stir in the vinegar, in which the treacle and gum solution have been dissolved, finally mix in the solution of rubber (which has been dissolved in the oil by beating them together), well mix the whole and put up in bottles fitted with corks and sponge on wire. Another formula on similar lines is this:—

Ingredients.—6 to 7 gallons vinegar.

6 oz. gum-arabic.

20 lb. bone-black.

6 oz. india-rubber (caoutchouc).

48 oz. (by weight) rape oil.

15 lb. treacle.

4 lb. sulphuric acid.

1 lb. gum-arabic.

Method of Preparation.—Make the oil hot and dissolve therein the caoutchouc (cut up small); when the rubber has dissolved mix in the bone-black, then the treacle, well grinding up the whole together. Dissolve the 6 oz. of gum-arabic in the vinegar, and then mix that fluid with the bone-black, and when the mixture is homogeneous add the sulphuric acid, constantly stirring the mixture while so doing; then allow fourteen days' rest, and finally add the 16 oz. of gum-arabic ground up in fine powder, and let the mixture stand for another fourteen days before putting the blacking into bottles.

Self-shining Blacking for high-class kinds of leather:—

Ingredients.—1 lb. gum-arabic.

6 oz. treacle or brown sugar.

1 pint black ink (from gall and iron).

8 oz. good vinegar.

4 oz. methylated spirits.

4 oz. olive oil.

Method of Preparation.—Dissolve the gum in the ink and when that has dissolved slowly incorporate the oil so as to form an emulsion; this is best effected by rubbing them together in a mortar until these ingredients are well combined, then slowly add the vinegar, stirring all the time so as not to separate the oil, and lastly work in the spirit in the same way.

This compound gives a good gloss by rubbing it on the leather with the finger tips. The gloss is not lasting, and moreover is not waterproof, but is washed off by wet; thereby it is unfitted for use on boots and shoes that are to be worn out of doors in wet weather, as the hem of the garment would be soiled by the blacking.

A *Second Formula* for a similar blacking is prepared from the following :—

Ingredients.—1 lb. gum-arabic.

1 pint good vinegar.

4 oz. olive oil.

3 oz. lamp-black.

$\frac{1}{2}$ oz. indigo (finely powdered).

6 oz. treacle.

8 oz. malt vinegar.

4 fluid oz. methylated spirits

Incorporate all these ingredients as follows :—

Method of Preparation.—Dissolve the gum in the pint of vinegar and then rub up therein the lamp-black and indigo (having first mixed them together by sifting); when these

powders are mixed in, slowly incorporate the oil and rub up until the mass is homogeneous, then work in the treacle, and afterwards in the order named the malt vinegar and spirits of wine; when well mixed put in bottles for use.

A much better *Self-polishing Gloss or Lacquer*, which is waterproof, is prepared from the following:—

Ingredients.—2½ gallons methylated spirits.

5 lb. shellac.

1½ lb. white wax.

2 lb. castor oil.

lamp-black, q. s.

Digest the shellac in the spirit and separately dissolve the wax in the oil, then mix the two fluids (hot), and lastly work in the lamp-black until of a sufficient consistency.

The following Compounds are better described as *Dressings or Emollient Compounds* than blackings proper. They are waterproof, and partake somewhat of the nature of dubbin, but they are chiefly useful for the uppers of high-class leathers that do not require a brilliant polish; they can be used for bags, belts and similar leathers that do not require a high polish.

Ingredients (No. 1).—15 lb. wax.

1½ lb. tallow.

20 lb. linseed oil.

2 lb. litharge.

10 lb. treacle.

10 lb. lamp-black.

28 lb. turpentine.

½ lb. shellac.

3½ oz. of nigrosine.

Method of Preparation.—Put the oil into a suitable boiling vessel and add the litharge, and raise to a temperature of 230° to 250° F., and then mix in the wax and tallow and stir

up well, then add the lamp-black and allow the mixture to cool, then thin down with the turpentine. Separately dissolve the shellac and aniline dye in the spirit, and finally mix this with the blacking compound.

Ingredients (No. 2).—9 lb. beeswax or ceresine wax.
 3 lb. spermaceti.
 35 lb. turpentine.
 2 lb. asphalt varnish.
 1 lb. borax.
 2 lb. lamp-black.
 1 lb. Prussian blue.
 ¼ lb. mirbane (nitro-benzol).

Method of Preparation.—Melt the beeswax and spermaceti with the borax, and stir together until jellified, then dissolve the asphalt varnish in the turpentine, then mix the two and afterwards add the other ingredients in the order named. The mirbane gives a fragrance and disguises the odour of the turpentine.

A Compound that is suited for Bag, Belt, etc., Leather, as well as boots and shoes, is prepared as follows:—

Ingredients.—16 oz. white wax.
 8 oz. white soap.
 4½ pints water.
 2 oz. gelatine or transparent glue.
 3 oz. gum-arabic.
 4 oz. brown sugar candy.
 5 fluid oz. methylated spirit.
 6 oz. drop-black.

Method of Preparation.—Cut up the wax and dissolve it in water by making the water boiling hot; having soaked the glue in water for a few hours, put that into the boiling wax solution and afterwards the gum-arabic in powder, the sugar candy and white soap cut up in shreds, and heat the whole until homogeneous; then put in the methylated spirit and

allow the compound to cool, then stir in the drop-black. For use lay a thin coating of the dressing on the leather, and then polish by brushing with a stiff brush.

An Expensive but Good Quality Dressing is obtained from the following :—

Ingredients.—3 lb. lamp-black.
 $\frac{1}{2}$ lb. bone-black.
 5 lb. of a mixture of glycerine and treacle.
 2 $\frac{1}{2}$ oz. gutta-percha dissolved by heat in
 10 oz. olive oil, and then
 1 oz. stearin stirred into the gutta-percha solution.
 5 oz. gum-arabic.

Method of Preparation.—Mix the lamp and bone blacks with the glycerine and treacle and then mix this with the gutta-percha mixture, separately melt 5 oz. of gum-arabic in 24 oz. of water, and perfume this mucilage with 1 drachm of oil of rosemary and 1 drachm of essential oil of lavender, and mix them with the lamp-black compound; finally thin down for use with three or four times its weight of water.

A Dressing that is Suited for Soft, Dull, Calf Kid and superior quality kip leather of uppers is prepared as follows :—

Ingredients.—4 lb. gelatine or white glue.
 4 lb. Castile soap (or white palm oil soap).
 1 lb. yellow wax.
 1 lb. neatsfoot oil.
 lamp-black, q. s.

Method of Preparation.—Soak the glue in water for some time and then pour off superfluous water, and finally melt the glue in a steam-jacketed kettle. Separately cut up the soap and dissolve it in sufficient water by heating it until all the soap has dissolved and mix it with the glue solution boiling hot, then cut up the wax and put that in and continue heating and stirring until dissolved, then put in the

neatsfoot oil and sufficient lamp-black to give colour and consistency. Mix well, and it is ready for use at once.

A *Waterproof Dressing* or "Dubbin" is prepared from these:—

Ingredients.—1 lb. black rosin.
1½ lb. beeswax.
1 lb lamp-black.
1 lb. Prussian blue.
turpentine, q. s.

Method of Preparation.—Melt the rosin and beeswax together, separately mix the lamp-black and Prussian blue by sifting, and then mix that in the rosin mixture, allow to cool, and then dilute with the turpentine to a suitable consistency.

Another *Good Waterproof Dressing* for winter use is this one:—

Ingredients.—15 oz. spermaceti.
3½ oz. india-rubber.
2½ lb. tallow.
11 oz. lard.
1½ lb. amber varnish

Method of Preparation.—Melt the spermaceti and tallow together and then add the india-rubber cut up small, and when it is dissolved put in the lard, and finally the varnish, and when all is well incorporated, by stirring together while hot, the dressing is ready for use.

The following is a *Fluid Gloss* suited for *Glaze Leathers*:—

Ingredients.—1 gallon vinegar.
½ gallon water.
1 lb. white glue.
2 lb. logwood chips.
1 oz. soft soap.
1 oz. isinglass.
1 oz. indigo (powdered).

Method of Preparation.—Mix the vinegar and water and then put in the glue and heat the mixture to boiling. When the glue has dissolved put in the logwood chips and boil for half an hour, then put in the soft soap, isinglass and indigo, and continue the boiling for another ten minutes; afterwards strain through muslin, and when cold bottle for use. Brush off all dirt, etc., from the leather and then lay on the above dressing with a sponge and allow it to dry.

A Second Formula for a similar liquid dressing is this:—

Ingredients.—1 gallon vinegar.
 $\frac{1}{2}$ gallon water.
 1 lb. white glue.
 2 lb logwood chips.
 1 oz indigo (powdered).
 2 oz bichromate of potash.
 2 oz. gum tragacanth (powdered).
 1 lb. glycerine.

Method of Preparation.—Boil all these ingredients together for several hours (do not let the fluid evaporate too much), then strain and put in bottles.

A Third Good Liquid Dressing for boot and shoe leather is this:—

Ingredients.—1 gallon beer.
 1 oz. isinglass.
 1 oz. gum tragacanth.
 1 lb. glycerine.
 2 oz. extract of logwood.
 1 oz. powdered galls.
 2 oz. sulphate of iron.

Method of Preparation.—Steep the logwood, galls, gum and isinglass in the beer for a week, then add the glycerine, strain and dissolve the sulphate of iron in the mixture, and, if necessary, again strain the fluid, when it is ready for use.

This dressing is very useful for light leathers (glacé), etc.

A Liquid Dressing for all kinds of Light Leathers that require a soft but not brilliant gloss is obtained from the following:—

Ingredients.—2 gallons water.
 6 oz. logwood extract.
 6 oz. borax.
 1½ oz. shellac.
 1 oz. bichromate of potash.
 1 pint water.
 6 fluid oz. liquid ammonia.

Method of Preparation.—Boil the extract of logwood in half the water until dissolved, and in the remainder of the water boil the shellac and borax until the shellac has dissolved. Separately dissolve the bichromate of potash in half a pint of water, then add all these fluids together, and finally put in the liquid ammonia.

A Liquid Dressing for Kid Leather

Ingredients.—5 oz. strong liquid ammonia.
 1 quart water.
 10 oz. shellac.
 aniline black, q. s.

Method of Preparation.—Dissolve the aniline black in the water by boiling, then put in the ammonia, and directly afterwards the shellac, and continue the boiling until the shellac has dissolved. This dressing is laid on with a sponge, and polished (if desired) by brushing. It gives a curious greyish-black, and is not waterproof.

Glosses, Lacquers and Varnishes for Patent Leathers.

The following is a very simple formula, but gives fair results:—

Ingredients.—½ gallon methylated spirits.
 1½ lb. shellac.
 3 oz. cod-liver oil or sperm-oil.
 1 to 2 oz. lamp-black.

Method of Preparation.—Dissolve the shellac in the spirit, and separately grind up the lamp-black in the oil, then mix the two fluids; apply with a sponge.

The following Compound is suited for enamelled as well as patent leathers:—

Ingredients.—1000 oz. methylated spirits.
 10 oz. mastic resin.
 20 oz. sandarach resin.
 8 oz. shellac.
 nigrosine to colour.

Method of Preparation.—Dissolve the nigrosine in the spirit, and then dissolve both the resin and shellac.

Reuver for Patent Leathers.—

Ingredients.—1 lb. treacle.
 2 oz. gum-arabic.
 4 lb. ivory-black.
 water, q s.

Method of Preparation.—Dissolve the gum in a little water, then mix it with the treacle, and having stirred in the ivory-black, heat and stir until all the components are thoroughly incorporated.

Spirit Renovator for Patent Leathers.—

Ingredients. 1 gallon methylated spirits.
 4 lb. shellac.
 1 fluid oz. turpentine.
 4 oz. camphor.
 4 oz. castor-oil.
 2 oz. nigrosine.

Method of Preparation.—Dissolve 2 oz. of nigrosine in the spirit, and when dissolved put in the shellac and allow that to dissolve. Separately dissolve the camphor in the turpentine, and mix that with the oil, then mix this compound

with the shellac lacquer. If required thin add more spirit. It is laid on the clean leather with a sponge, and requires no polishing, but gives a beautiful waterproof gloss.

Alkaline Renovator for Patent Leathers:—

Ingredients.—1 quart paraffin or petroleum oil.

5 fluid drachms oil of lavender

5 fluid drachms essence of citronel.

10 fluid oz. spirits of ammonia.

Method of Preparation.—Shake well before use, and after cleaning the leather free of all dirt, lay on the renovator with a sponge

A Paste Renovator for Patent Leathers:—

Ingredients.—White wax

Olive oil

Turpentine.

Oil of lavender.

Method of Preparation. Melt the wax and add sufficient oil to render it semi-fluid when cold, and while still warm add sufficient turpentine to make it into a paste, and add a little oil of lavender to perfume the compound. Apply a thin coat, and then polish by rubbing with a piece of clean linen rag.

A Wax Polish for Patent Leathers.

Ingredients.—5 lb. white wax.

5 lb crown soap.

25 oz. ivory-black.

5 oz. indigo (powdered).

50 oz. cocoa-nut oil.

Method of Preparation.—Melt the wax over the fire, and then dissolve the soap therein (cut up small); when homogeneous stir in the black and blue pigments, and finally the cocoa-nut oil; stir until all the ingredients are well in-

corporated, and stir until cold to prevent separation of the wax, then pour out into tins or moulds. A little of the wax is rubbed on the patent leather, and then a polish brought up by rubbing briskly with a piece of clean rag.

CREAMS, GLOSSES, POLISHES, ETC., FOR BROWN LEATHER BOOTS AND SHOES.

Since the firm hold that brown leather boots and shoes have secured in popular favour, there is a regular trade done in polishing compounds for this kind of leather. The leather itself is of a different tanning, and curried in a different manner to what black boot leathers are treated, some of the low-priced boots and shoes being made with leather that is little better than stout brown paper. If such leather be treated with any kind of dressing it soon becomes abraded, shabby, and worn out. One of the best kinds of dressings to apply to such porous leather is a waterproof wax polish; the so-called creams are not absolutely waterproof, as they are made into a cream by the aid of soap, and as soap is soluble in water such creams do not resist the penetration of water into the fibre of the leather. Such a wax polish is far more emollient than any preparation in which shellac forms an ingredient.

A very simple Wax Polish for Brown Leather is prepared by dissolving—

Ingredients.—1 part spermaceti wax,
2 parts paraffin wax,
3 to 4 parts paraffin oil,

and when incorporated by stirring pour into tins or moulds to solidify.

A little of the wax when rubbed into the leather and polished by rubbing with a rag will render the leather non-porous and improved in appearance. This polishing wax

is without colour, and therefore is suited to any shade of brown leather. It is also suitable for rendering brown canvas shoes waterproof by melting the wax and rubbing it into the canvas while warm.

A General Formula for Creams is the following:—

Ingredients. —1 lb. curd soap.

44 pints water

2 lb. beeswax

2 lb. turpentine.

colouring matter as desired.

Method of Preparation.—Cut up the soap and dissolve it in the water by boiling, then separately dissolve the wax in the turpentine by heating the two together, and then slowly pour this into the soap solution, and briskly stir or whip the mixture until the mass is cool and of a creamy consistency. If the stirring be not continuous while the mass is cooling, the wax will granulate and separate from the other ingredients, whereas by constant brisk stirring, the mass becomes of a creamy consistency. Owing to the presence of the turpentine, aniline dyes cannot be mixed with the cream after it is made, but by dissolving them in the water before dissolving the soap therein, then the mass can be coloured by any of the aniline dyes soluble in water.

For a *Brown Cream* 16 scruples of Bismarck brown B would be sufficient for the above quantity of ingredients. But as the above dye stains the leather a deeper brown as it is used time after time, it can be replaced with phosphine substitute, the quantity of which must be determined by the particular tone of brown colour desired. If the cream is to be coloured the fashionable *green* colour now being worn, Victoria green may be used alone, or toned deeper with a little aniline blue. For a *black* cream use nigrosine. All these dyes must be mixed with the soap solution before incorporating the wax and turpentine. If the

aniline dyes are not desired, the natural colouring matters, such as turmeric, annotta, dragon's blood, etc., may be used, and they can be first digested in the turpentine before dissolving the wax therein. For a white cream use white wax instead of beeswax, and do not add any colouring matter.

A Cheap Brown Cream for boots and shoes, bags, harness, etc., is the following:—

Ingredients.—4 lb. best yellow wax (ceresine)
 $\frac{1}{2}$ lb. pearl ash.
 2 lb. best yellow soap.
 12 lb. water.
 8 lb. turpentine.
 $\frac{1}{2}$ lb. methylated spirit.

Method of Preparation.—Put the pearl ash into the water, and set it over a fire to boil, and scrape into it the wax and soap, and let the mixture boil until both soap and wax are dissolved. Stir well until homogeneous, and then allow to cool down somewhat, and mix in the turpentine, and lastly the spirit. Well mix the whole by stirring, and if required thinner add water, q. s. Well rub the cream into the leather, and when dry polish with a soft brush, and afterwards with a linen cloth.

A somewhat similar compound is the following:—

Ingredients.—6 lb. yellow wax.
 5 lb. turpentine.
 4 lb. lard.
 3 oz. burnt sugar.
 6 fluid oz. of a spirit varnish.

Method of Preparation.—Heat the wax, lard and turpentine together until homogeneous by stirring, then remove from the fire, and stir until creamy, then mix in the burnt sugar colouring, and finally the spirit varnish, and continue the stirring until the compound sets.

Tan Paste for Softening and Polishing Brown Leather :—

Ingredients.—6 lb. beeswax.

2 lb. lard.

½ lb. neatsfoot oil.

2 lb. turpentine.

dragon's blood for colouring.

Method of Preparation.—Melt the wax and lard together, then add the oil and stir well, allow to cool and mix in the turpentine before the mixture cools too much, then add the colouring matter, stirring it well in. For use rub the polish on the leather, polish with a brush, and then rub with a linen rag.

Gloss for Brown Patent Leather :—

Ingredients.—2 lb. gum-arabic.

2 lb. treacle

1 lb. vinegar.

½ gallon water.

16 oz. (by weight) of olive or almond oil.

16 oz. methylated spirits.

Method of Preparation.—Dissolve the gum in the water, and the treacle in the vinegar, mix these fluids together, then add the oil, and after shaking well and stirring put in the spirit, strain, and for use lay on with a sponge. This gloss, however, is not waterproof, and is easily washed off with a wet sponge.

A Waterproof Gloss for Brown Leather is prepared from the following :—

Ingredients.—4 lb. orange shellac.

1 lb. resin.

2 gallons methylated spirits.

4 oz. camphor (powdered).

1 oz. dragon's blood.

1 oz. annotta.

Method of Preparation.—Dissolve the shellac in the spirit, and when dissolved add the camphor (in powder), and then colour with the dragon's blood and annotta and shake well. Lay on the cleaned leather with a sponge, and if too thick warm it. To remove from the leather dip a sponge or rag into methylated spirits, and rub over the leather.

Dubbin for Russia Leathers —

Ingredients.—1 lb. palm oil.
 3 lb. best yellow soap.
 4 lb. oleic acid
 1½ lb. tannic acid solution (1 oz. tannic acid, 6 oz. water).

Method of Preparation.—Cut up the soap and dissolve it by heating in the oil to 100° F., then add the oleic acid and tannic solution, and stir until cold. The resulting compound is a good grease or dressing for football boots and similar leathers.

Treeing Compositions.—All good quality boots and shoes should be kept on "trees" when not in wear, and an occasional "slicking" with the horn handle of a shoehorn or the bone handle of a knife will tend to keep the leather soft and pliable, and free from wrinkles. The following compounds are suited for use when treeing boots and shoes. For crup, calf, kip, and similar upper leathers, a solution of gum tragacanth is the most effectual composition in use. If the surface of the leather is rough, sponge it well with a little gum tragacanth mucilage, and when that is nearly dry slick the leather (*i.e.*, rub it smooth with a piece of bone or horn, or even polished steel), and when the dressing is dry lay on a coat of blacking and polish in the usual way by brushing. If the leather shows a brown appearance due to wear, just sponge it over with a little oil before laying on the gum tragacanth, and if the brown is very much

Apparent, colour the gum tragacanth with nigrosine soluble in water. The gum tragacanth is not easily soluble; it requires several days' digestion in water, but by acidulating the water with a little sulphuric acid or oxalic acid, the gum will then dissolve more quickly than when plain water is used. One oz. to 2 oz. of gum per gallon of water is sufficient, and before using the mucilage all white (*i.e.*, undissolved) lumps should be removed by picking out, or else by straining the mucilage. If a soft drying mucilage is required, one that will not cake, a little neatsfoot oil should be mixed in with the gum tragacanth mucilage, the mucilage having been coloured beforehand with nigrosine or black ink. If the boots show any exudation of the stuffing grease, they should be lightly sponged over with a sponge dipped in benzine, so as to remove the surface grease, and then the gum tragacanth mucilage applied and the sicking proceeded with as above described.

If boots are to be laid away out of use for some time they should be lightly sponged over with a little essential oil of cloves, almond, lavender, rosemary, or some other essential oil, which will prevent the leather becoming mildewed or mouldy.

To Renovate French Kid Uppers prepare the following compounds:—

Method of Preparation.—Soak good glue in water, 1 part glue to 4 or 5 times its weight of water, for several hours, and then melt by heating to boiling point, and pouring out the solution when formed to set into a jelly. Now put 16 oz. of the jelly into a saucepan, and mix with it 4 oz. nigrosine, and when the glue has dissolved and the solution of a black colour, add a solution of soap and sperm oil, which is made separately, thus:—

Cut up 4 oz. of common soap, and dissolve it by boiling in 1 pint of water, and when dissolved add 1, 2, or 3 oz.

Method of Preparation.—Dissolve the shellac in the spirit, and when dissolved add the camphor (in powder), and then colour with the dragon's blood and annotta and shake well. Lay on the cleaned leather with a sponge, and if too thick warm it. To remove from the leather dip a sponge or rag into methylated spirits, and rub over the leather.

Dubbin for Russia Leathers —

Ingredients.—1 lb. palm oil.
 3 lb. best yellow soap.
 4 lb. oleic acid
 1½ lb. tannic acid solution (1 oz. tannic acid, 6 oz. water).

Method of Preparation.—Cut up the soap and dissolve it by heating in the oil to 100° F., then add the oleic acid and tannic solution, and stir until cold. The resulting compound is a good grease or dressing for football boots and similar leathers.

Treeing Compositions.—All good quality boots and shoes should be kept on "trees" when not in wear, and an occasional "slicking" with the horn handle of a shoehorn or the bone handle of a knife will tend to keep the leather soft and pliable, and free from wrinkles. The following compounds are suited for use when treeing boots and shoes. For crup, calf, kip, and similar upper leathers, a solution of gum tragacanth is the most effectual composition in use. If the surface of the leather is rough, sponge it well with a little gum tragacanth mucilage, and when that is nearly dry slick the leather (*i.e.*, rub it smooth with a piece of bone or horn, or even polished steel), and when the dressing is dry lay on a coat of blacking and polish in the usual way by brushing. If the leather shows a brown appearance due to wear, just sponge it over with a little oil before laying on the gum tragacanth, and if the brown is very much

Method of Preparation.—Colour the spirit by digesting the dragon's blood and gamboge in it for several hours, and then strain or filter the coloured fluid, and in the filtrate dissolve the solid resins.

• The last two preparations are laid on lightly with a sponge and allowed to dry in a warm air. They can be coloured any colour by using any suitable aniline dye soluble in spirits.

Bronze Lacquer for morocco leather of slippers, etc. —

Ingredients.— $\frac{1}{2}$ lb. aniline red.
 $\frac{1}{2}$ oz. aniline blue.
 5 lb. gelatine
 2 $\frac{1}{2}$ gallons acetic acid.

Method of Preparation.—Dissolve the dye in $\frac{1}{2}$ gallon of the acid, and the gelatine in the remainder of the acid, and then mix the two fluids

Crimson Purple Bronze —

Ingredients.—6 to 8 oz. aniline violet
 40 fluid oz. water
 egg albumen.

Method of Preparation.—Dissolve the aniline dye in the water, and lay it on the leather with a sponge, and when dry give an application of the egg white, which should be mixed with an equal bulk of warm water. Instead of the egg albumen the caseine obtained from curdled milk dissolved in ammonia may be used to fix the aniline dye on the leather.

Bronze Lacquer for shoe leathers, dancing slippers, etc.

Ingredients.—1350 parts (by weight) methylated spirit.

130 parts magenta.
 65 parts aniline blue.
 410 parts gum benzoin.
 65 parts benzoic acid.

Method of Preparation.—Dissolve the dyes in the spirit, then add the acid, and finally the gum. This gives a splendid bright red bronze lacquer.

Wax Polish for bronze leather for bags and portmanteaus.

Ingredients.—1 lb. beeswax,
1½ lb. spermaceti.
2½ lb. paraffin oil.
½ lb. turpentine.

Method of Preparation.—Melt the waxes, and when cool add the turpentine and then the paraffin oil.

CHAPTER II

HARNESS POLISHES, BLACKINGS, DRESSINGS, COMPOSITIONS, GREASES, SOAPS, BOOT-TOP POWDERS AND LIQUIDS.

Coachmen's Boot-top Powder

Ingredients.—1 lb. white burnt alum
1 lb. white chalk.
1 lb. cream of tartar.
1 lb. magnesia.
1½ lb. oxalate of potash.
2 lb. gum-arabic (powdered).
2 lb. oxalic acid (powdered)
2 lb. pumice stone

Method of Preparation Mix all the ingredients together by sifting several times through sieves of various meshes, and finally through a fine sieve. Put up in packets of about 1 oz. each.

For use dissolve one packet in 10 fluid oz. of water (free from lime), and shake up together; apply this fluid to the boot-top with a sponge, and then when dry polish by brushing with a special boot-top brush. (Give a second application, if necessary, when the first is dry.

Pink or Flesh-coloured Boot-top Powder :—
(31)

Ingredients.—2½ lb. oxalic acid (powdered).

1½ lb. cream of tartar.

½ lb. sugar of lead.

1 lb. pumice stone.

2½ lb. gum-arabic.

3 drachms saffron.

4 drachms French carmine.

Method of Preparation.—Mix all the ingredients together in the powder state by sifting several times through hair sieves, and then divide into 3 oz. packets. For use mix one packet with a pint of water, and apply as directed in last recipe.

Nut Brown Boot-top Powder —

Ingredients.—Same as in pink powder (see last recipe), but use a drachm of burnt sienna instead of the carmine.

Boot-top Liquids —

Ingredients (No. 1).—1½ gallons water.

8 oz. oxalic acid (very poisonous).

8 oz. sulphate of zinc (very poisonous).

Method of Preparation.—For use wash the leather over with a sponge dipped in clean water, then rub it over with a sponge dipped in the above fluid.

Ingredients (No. 2).—1 gallon sour milk.

½ lb. gum-arabic (powdered).

8 lemons, juice of.

8 eggs, whites of.

8 oz. sulphuric acid.

Method of Preparation.—Dissolve the gum in the milk, and then mix all together.

Ingredients (No. 3).—Equal weights of butter of antimony (trichloride of antimony).

Cream of tartar.

Tartaric acid.

Burnt alum.

Method of Preparation.—Mix in twice its weight of sour milk.

Ingredients (No. 4).—1 gallon sour milk.

- 1 lb. alum.
- 1 lb. cream of tartar.
- 1 lb. magnesia.
- 1 lb. oxalic acid.
- 4 oz. salts of sorrel (oxalate of potash).
- 4 oz. acetate of lead
- 4 gallons water.

Method of Preparation—Mix all together, and boil until the solids are dissolved.

Brown Boot-top Liquid —

Ingredients (No. 5).—1 lb. alum.

- 1 lb. annotta.
- 1 lb. oxalic acid
- $\frac{1}{2}$ lb. isinglass
- $\frac{1}{2}$ lb. acetate of lead
- $\frac{1}{2}$ lb. oxalate of potash
- 4 gallons water.

Method of Preparation.—Boil until the solids are dissolved.

Ingredients (No. 6).—1 oz. potassium chloride.

- 32 oz. distilled water
- 2 oz. commercial hydrochloric acid.
- 48 oz. methylated spirits.
- 8 oz. essential oil of senna.

Method of Preparation—Mix the potassium chloride with the water, and when dissolved add the acid, separately mix the spirit and essential oil, and then mix the two fluids. Apply with a clean sponge and dry at a gentle heat, then polish with a boot-top brush.

Waterproof Boot Grease :—

Ingredients.—1 lb. lard.

- 1 lb. olive oil.
- $\frac{1}{4}$ lb. caoutchouc

Method of Preparation.—Melt together over a slow fire.

This compound is applied to boot uppers and soles of boots, which it is desired to render waterproof.

Renovators for Treeing Boots.—Kip and rough leather uppers of boots may be smoothed down and rendered capable of taking a polish by ordinary blacking when treated to the following dressing:—

Ingredients.—1 oz. nigrosine.
1 gallon water.
1½ oz. gum tragacanth (powdered).
‡ oz. oxalic acid.
‡ pint neatsfoot oil.

Method of Preparation.—Dissolve the nigrosine in the water, and then dissolve therein the oxalic acid, then put in the gum tragacanth, and allow it a few days to dissolve until it forms a jelly. Give an occasional stir up of the mixture; when all the gum has dissolved, and there are no white lumps, add the oil so as to prevent the dressing caking together.

Military Boots, Belts and Breeches to whiten:—

Ingredients.—1 pint linseed oil.
5 oz. oxide of zinc.
amber or copal varnish.

Method of Preparation.—Mix the zinc white with the oil, and rub the mixture into the buff leather it is desired to whiten, and dry the leather at a heat of 160° F. When dry roughen the whitened part by scouring with pumice powder, and give another coating, and after drying the second coat, give a coat of varnish.

Renovator for Buff Leather Riding Breeches:—

Ingredients.—16 oz. yellow ochre.
16 oz. pipeclay.
4 oz. starch.
‡ oz. olive oil.
water, q. s.

Method of Preparation.—Mix the oil and yellow ochre, then mix in the pipeclay and starch (in dry powder), and when well mixed pour in sufficient boiling water to make the whole of a semi-fluid or pasty mass, and allow it to become cold, when it should be laid on the leather, allowed to dry, then rubbed and brushed well.

Waterproof Harness Polish.—The following compound requires to be laid on hot, and when it is dry it resists water:—

Ingredients.—1 lb. glue.
 4½ pints vinegar
 6 oz. gum-arabic
 30 oz. black ink
 ½ oz. isinglass.

Method of Preparation.—To prepare this polish soak the glue in one-third of the vinegar until perfectly soft, separately dissolve the gum in the ink, melt the isinglass in as much water as will just cover it, aiding solution by warming the water. To compound these ingredients put the glue into a boiler, and add the remainder of the vinegar, and heat the mixture until the gum has all dissolved, keeping the heat below boiling point, then add the gum solution, and allow the mixture to reach the same temperature, and then put in the isinglass, beat up for five minutes, and then bottle for use. If left exposed to the air the compound dries to a tough rubber-like compound. For use the harness is cleaned, and the polish laid on with a dry (not wet) sponge.

Harness Lacquer for Black Harness:—

Ingredients.—2½ lb. shellac.
 10 oz. sandarach resin.
 5 oz. mastic resin.
 3 gallons methylated spirit.
 1½ to 1¾ lb. Venice turpentine.
 aniline black soluble in spirit, q. s.

Method of Preparation.—Colour the spirit with the nigro-sine, and then dissolve the solids therein.

Dressing for Carriage Tops of Barouches, etc. :—

Ingredients.—2 lb. glue.

3 lb. ordinary soap.

11 to 14 gallons water.

3 to 4 lb. spirit varnish.

2 lb. good white starch.

Method of Preparation.—Soak the glue in a portion of the water, and then heat the softened glue with the remainder of the water, and then cut up the soap and add that to the hot glue, and when dissolved stir in the varnish. Separately mix the starch with a little water, stir in and fully heat the mixture for five to ten minutes, stirring all that time. This dressing is ready for use when cold. By concentrating the compound by evaporation it may be made solid enough to bear putting up in tins or moulds, and then for use it only requires to be liquefied with water or beer.

White Lacquer for White Enamelled Leather —

Ingredients.—Carbonate of baryta (precipitated).

linseed oil varnish.

copal varnish.

Method of Preparation.—Mix up some barium carbonate with linseed oil varnish, and lay this on the leather, then on this lay a coating of copal varnish in which carbonate of barium has been mixed, and allow the coating to dry, then rub down the coat of lacquer with pumice stone and a piece of felt, and polish with levigated bone ash.

Lacquer for Varnishes for Enamelled Leather Carriage Tops, and all leather that is required to be flexible:—

Ingredients.—1 lb. orange shollac.

1 lb. sandarach resin.

5 lb. Venice turpentine.

4 lb. turpentine.

1 lb. lamp-black.

98 lb. methylated spirit.

Method of Preparation.—Dissolve the shellac in the spirit, and the sandarach in the turpentine, then mix the two and add the lamp-black, well mix by stirring, and lay on with a sponge.

Elastic Varnish

Ingredients.—1 gallon turpentine.

8 oz. india-rubber.

linseed oil.

Method of Preparation—To incorporate these ingredients dissolve the rubber in the turpentine, and reduce by standing until a jelly-like sediment is formed. Pour off any fluid turpentine from the settled sediment, and then mix equal quantities of the india-rubber jelly with hot linseed oil. Melt by a gentle heat. This varnish is useful when elasticity and flexibility are required, and a brilliant gloss not wanted. It is also suited to renovate india-rubber carriage aprons, goloshes, etc.

A Self-shining Lacquer for Enamelled Harness is prepared from the following:—

Ingredients.—14 gallons methylated spirit.

10 oz. yellow rosin (colophony).

2 oz. camphor.

4 lb. mastic resin.

10 lb. sandarach resin.

20 lb. shellac.

10 lb. Venice turpentine.

Method of Preparation.—Digest all the solids in the spirit,

and to deepen the colour add sufficient nigrosine or sloeline* soluble in spirit.

A Polish for Black Harness is prepared from—

Ingredients.—1 lb. treacle.
 2 lb. lamp-black.
 2 teaspoonfuls of yeast.
 2 oz. sugar candy.
 2 oz. olive oil.
 2 oz. gum tragacanth.
 2 oz. isinglass.
 1 cow's gall.
 $\frac{1}{2}$ gallon stale beer.

Method of Preparation.—Dissolve the sugar candy in a little water, and add that to the treacle, then mix in the camphor, afterwards add the oil, and having dissolved the gum tragacanth in water, acidulated with sulphuric acid, mix that in and also the isinglass dissolved in a little warm water, finally add the galls, and then thin down with the beer, and stand in a warm place for an hour or two.

A Harness Oil for Black Harness is prepared from—

Ingredients.— $\frac{7}{8}$ gallon methylated spirit.
 3 $\frac{3}{4}$ gallons fish oil (sperm or cod-liver).
 4 $\frac{1}{2}$ gallons Virginia oil.
 14 quarts turpentine.
 1 $\frac{1}{2}$ quarts coal-tar oil.
 1 lb. lamp-black.
 4 lb. shellac.

Method of Preparation.—Dissolve the shellac in the spirit, and then mix in the fish-oil, then the lamp-black, and afterwards all the other ingredients in the order named.

The following blacks and dressings are so varied in composition that they do not permit of classification :—

Ingredients.—1 lb. mutton suet.
 3 lb. beeswax.
 3 lb. sugar candy.
 6 lb. soft soap.
 2½ lb. lamp-black.
 ½ lb. powdered indigo.
 1 quart turpentine.

Method of Preparation.—Melt the suet and wax together, then add the sugar candy (powdered), the soft soap, the lamp-black and indigo are then added, and when all are mixed add the turpentine.

A Liquid Blacking for Harness —

Ingredients.—1 lb. glue.
 ½ lb. gum-arabic.
 45 fluid oz. water.
 21 oz. treacle.
 15 oz. animal charcoal.

Method of Preparation.—Soften the glue and the gum in the water, and dissolve by gently heating, then mix in the treacle and bone-black, and evaporate until of a proper consistency, and put in corked bottles

A Liquid Blacking that requires warming before use:—

Ingredients.—1 lb. treacle.
 2 lb. lamp-black.
 2 lb. olive oil.
 2 lb. gum-arabic.
 2 lb. isinglass.
 64 lb. water.
 2 fluid oz. methylated spirits.

Method of Preparation—Melt all the ingredients together except the spirit, and then add that last. Warm the blacking before use, and lay on with a sponge.

A Waterproof Liquid Blacking is made from the following :—

Ingredients (No. 1).—1 gallon boiled oil.

½ lb. india-rubber.

Method of Preparation.—Melt the rubber in half the oil by heating, and then mix in the remainder of the oil.

Ingredients (No. 2).—1 gallon of boiled oil.

1 lb. beeswax.

1 lb. colophony (rosin).

Ingredients (No. 3).—1 gallon olive oil.

32 oz. mutton suet.

8 oz. spermaceti wax.

8 oz. white wax.

Ingredients (No. 4).—1 gallon linseed oil.

8 lb. amber resin (powdered).

2 lb. asphaltum.

3 lb. gutta-percha.

2 lb. bisulphide of carbon.

Method of Preparation.—Dissolve the gutta-percha in the carbon bisulphide, and melt the amber and asphaltum in the oil by heating, then mix the two fluids.

A Liquid Dye for Black Harness that is abraded :—

Ingredients.—½ gallon turpentine.

5 lb. beeswax.

1½ lb. drop-black.

1½ lb. ivory-black.

1½ lb. common soda.

2½ oz. isinglass.

1 gallon black ink (gall and iron).

1 gallon neatsfoot oil.

Method of Preparation.—Dissolve the wax in the turpentine, and dissolve the soda and isinglass in the ink, and rub down the blacks in the oil, then mix altogether, and well stir. Shake up well before use; lay on with a sponge.

*Harness Pastes, Compositions, Dressings and Ball Blackings.**Ingredients.*—2 lb. common rosin.

3 lb. beeswax.

 $\frac{1}{2}$ lb. lamp-black $\frac{1}{2}$ oz. Prussian blue.

turpentine, q. s.

Method of Preparation—Melt the rosin and beeswax together, and then add the black and blue pigments (previously mixed together by grinding); when the mass is homogeneous remove from the fire, and mix in sufficient turpentine to make the whole into a stiff paste; for use lay on lightly with a sponge, and polish by brushing with a soft brush.

Another Harness Paste which can be coloured black or brown is prepared from the following:—

Ingredients—9 lb. stearin13 $\frac{1}{2}$ lb. turpentine

6 oz. animal black (or else yellow ochre and water).

Method of Preparation.—Cut up the stearin and melt it in the turpentine, and when melted mix in the colouring pigment. Warm the paste for use, lay it on lightly on the cleaned harness, and then polish by rubbing with a piece of flannel or old silk rag.

A Superior Waterproof Harness Paste is prepared from the following:—

Ingredients.—5 lb. white wax. $\frac{1}{2}$ lb. rosin.

6 lb. vaseline.

2 lb. soft soap.

2 lb. treacle.

4 lb. lamp-black.

 $\frac{3}{4}$ lb. Prussian blue.

turpentine, q. s.

Method of Preparation.—Melt the wax and rosin, and then

stir in the vaseline, and afterwards the soft soap, and add the treacle, and finally the blue and black pigment (mixed together by sifting).

A Good Harness Oil.—

Ingredients.—3 lb. beef tallow.

1 lb. neatsfoot oil.

bone-black, q. s.

Method of Preparation.—Melt the tallow but not hot enough to cause it to boil, then mix in the neatsfoot oil, and afterwards sufficient lamp-black to colour the mass.

Harness Composition :—

Ingredients (No. 1).—8 lb. beef suet.

2 lb. neatsfoot oil.

2 lb. white wax.

2 lb. gum-arabic (powdered).

1 quart turpentine.

bone-black, q. s.

Method of Preparation.—Melt the suet and wax together, then stir in the oil and gum, cool off slightly and add the turpentine, then incorporate the bone-black in sufficient quantity to make a stiff compound, stir then until cold, and then form into balls or mould into cakes, or else put it in tins while still plastic. For use the composition is warmed and lightly rubbed on the harness, and then a polish brought up by rubbing with flannel.

Ingredients (No. 2).—1 lb. hog's lard.

4 lb. neatsfoot oil.

4 lb. yellow wax.

5 lb. bone-black.

4 lb. brown sugar.

3½ pints water.

Method of Preparation.—Dissolve the sugar in the water, and having melted together the lard, wax and oil, and mixed therein the bone-black, stir in the sugar syrup, and heat the

- whole till boiling, and stir it until it is sufficiently cool to be moulded into cakes or balls.

A Harness Composition to be used with a sponge :—

Ingredients (No. 3).—1 lb. beeswax.

- 1 lb. soft soap.
- 2 lb Prussian blue.
- 1 gallon black ink (gall and iron)
- 1 gallon turpentine.

Method of Preparation.—Melt the wax and soft soap over the fire, then stir in the other ingredients and simmer altogether, then remove from the fire and stir until nearly cold; apply with a sponge, and polish by rubbing with a soft brush.

A Simpler Harness Composition consists of this :—

Ingredients (No. 4).—1 lb white wax.

- $\frac{1}{2}$ lb. drop-black.
- 2 oz. Prussian blue.
- 2 oz. oil of thyme.
- 1 quart of turpentine

Method of Preparation.—Slowly melt the wax, and when not too hot stir in the turpentine in which the black and blue pigments have been ground up; allow the mixture to boil and then add the oil of thyme; pour out into tins, and keep covered up. For use put a little of the composition on the harness with a stiff brush, and polish by brushing with a soft one, and afterwards polish with a chamois leather. The composition is waterproof, and suited alike to dull and enamelled leather harness.

A Superior Quality Ball Black is prepared as follows :—

Ingredients.—4 lb. beeswax.

- 1 lb. bone-black.
- $\frac{1}{2}$ lb. Prussian blue.
- 8 oz. linseed oil.
- 12 oz. turpentine.
- 4 oz. copal varnish.

Method of Preparation.—Grind up the blue and black pigments in the turpentine, then mix the oil and varnish, and having melted the wax stir in the black mixture, and when plastic form into balls. To prepare the above composition in paste form, add to the above ingredients while still warm, 1 lb. soft soap mixed with 1½ lb. turpentine.

A Good Harness Dressing is made of the following:—

Ingredients.—1 lb. beeswax,
 ¼ lb. singlass.
 ¼ lb. indigo.
 4 lb. soft soap.
 5 lb. glue.
 4 lb. logwood.
 ½ lb. animal charcoal.
 1½ gallons vinegar.

Method of Preparation.—Extract the goodness from the logwood by simmering it in the vinegar, and then strain it, then mix in the other compounds, and boil until the glue, etc., is dissolved, when it is ready for laying on with a sponge.

Another Form of Harness Dressing is made from these—

Ingredients.—2 lb. bone-black.
 2 lb. sulphate of iron.
 2 lb. neatsfoot oil.
 6 lb. brown sugar.
 8½ pints water.
 2 oz. gum tragacanth.

Method of Preparation.—Soak the gum tragacanth in the water for some days, then dissolve the sugar therein, then mix in the iron salt, and afterwards the oil, then grind up the compound with the bone-black, and boil until the water has evaporated, then stir until cold, and form into balls or cakes. Use in the usual manner of compositions.

A very Simple Black Harness Renovator is made by dissolving 1 lb. of gum copal in sufficient raw linseed oil by

heating it at 300° F., then dissolving therein 3 lb. of white wax, and mixing in 1 lb. of lamp-black; heat the mixture for five minutes to 200° F., then remove and stir until cold, and form into cakes or balls.

* *A Cheap Harness Oil* consists of 24 oz. of lamp-black mixed with 1 gallon of neatsfoot oil, and $\frac{1}{4}$ gallon of vinegar black, 1 lb. palm oil, 3 lb. common soap.

Cordova Wax Polish consists of the following :—

Ingredients.—30 fluid oz. of acetic acid.

30 fluid oz. beer.

5 fluid oz. solution of glue.

2 oz. bone-black.

1 oz. indigo.

Method of Preparation.—Boil all together for half an hour, and apply with a sponge.

A Wax Polish for Harness is made from these :—

Ingredients.—1 lb. white wax

1 lb. crown soap

2 lb. bone-black

5 oz. indigo (powdered)

10 fluid oz. nut oil

Method of Preparation.—Melt the wax and then add the soap, and continue heating until homogeneous, then mix in the wax and other pigments, and finally stir in the oil, and after well mixing stir until cold, and while still plastic put into moulds or form into balls.

Vaseline Harness Composition :—

Ingredients.—12 oz. Prussian blue (powdered).

4 lb. lamp-black.

2 lb. treacle.

2 lb. soft soap.

6 lb. vaseline.

5 lb. ceresine wax.

8 lb. colophony (rosin)

turpentine, q. s.

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Method of Preparation.—Mix the blue and black powders, the soft soap by grinding them therein, and then warm the mixture and work in the treacle; separately melt the resin,eresine and vaseline together, and then work that in the fluid ompound; when homogeneous mix in sufficient turpentine" o give the required consistency. †

Harness Oil for General Use :—

Ingredients.—2 lb. asphaltum.

3 lb. beeswax.

$\frac{1}{2}$ lb. lamp-black.

1 oz. Prussian blue.

neatsfoot oil, q. s.

Method of Preparation.—Melt the asphaltum, then stir in he wax, and when these two bodies are well mixed, add the amp-black and Prussian blue, then thin with the neatsfoot oil sufficient to give required consistency.

A Good Harness Dressing is prepared for general use hus:—

Ingredients.—1 gallon neatsfoot oil

2 lb. tallow.

2 lb. beeswax.

2 lb. beef tallow.

$\frac{1}{2}$ gallon castor oil.

1 oz. lamp-black.

Method of Preparation.—Put the first four ingredients into a boiler, and heat the mixture until homogeneous, then add the castor oil, and finally the black pigment; after well mixing strain through clean straining cloths, and the dressing is ready for use.

Harness Grease .—

Ingredients.—4 lb. ammonia soap.

1 lb. palm oil.

3 lb. common hard soap.

1 $\frac{1}{2}$ lb. tannic acid solution (9 parts of tannic used to 10 of water).

Method of Preparation.—Melt the oil and soap together, then put in the ammonia soap and the tannic acid solution, and well mix; keep in corked bottles; for use rub on only just as much of the paste as the leather will absorb. To prepare the ammonia soap heat $3\frac{1}{2}$ lb. olive oil to nearly the boiling-point, and add $\frac{1}{2}$ lb. liquor ammonia and stir until the odour of ammonia disappears.

CHAPTER III.

LEATHER GRINDERS' SUNDRIES.

Heel Balls.—These compounds are made of wax, lamp-black, turpentine, and some spirit varnish. The following formulæ give good products. It is usual with each maker to stamp each ball with his name or trade mark, and this stamping is done while the compound is plastic, or else by putting the compound into moulds when freshly made.

Formula No. 1.

Ingredients.—8 lb. bees-wax.

1 lb. tallow

1 lb. gum-arabic mucilage

1 lb. lamp-black

Method of Preparation.—Mix the lamp-black with the gum mucilage by grinding them together, then melt the wax and tallow, and after stirring to incorporate the two, stir in the lamp-black mixture, and well stir until homogeneous, then allow the compound to cool, and while still plastic cut into cakes with die stamp or else press in moulds.

Formula No. 2.

Ingredients.—16 oz. ivory-black.

16 oz. lamp-black.

4 oz. gum-arabic.

6 oz. raw brown sugar.

4 oz. glue, isinglass, or gelatine.

20 fluid oz. water.

Method of Preparation.—Melt the sugar and gum in the water, and soak the glue or gelatine therein, melt this mixture by heating it, and then stir in the black pigments.

•
Formula No. 3.

Ingredients.—32 oz. beeswax.
8 oz. suet.
8 oz. ivory-black.
6 oz. lamp-black.
4 oz. gum-arabic
4 oz. sugar candy.

Method of Preparation.—Powder the gum and candy, and after melting the wax and suet together, and incorporating them by stirring, mix in the gum and candy, and finally the black pigments, and put into leaden moulds.

Formula No. 4.

Ingredients.—16 oz. beeswax.
4 oz. suet.
4 oz. ivory-black.
4 oz. lamp-black.
2 oz. gum-arabic (powdered).
2 oz. sugar candy (powdered)
3 oz. black rosin (powdered).
2 oz. turpentine.

Method of Preparation.—Proceed to amalgamate the ingredients as in last recipe, melting the rosin along with the suet and wax, and when the mass is homogeneous allow to cool and then add the turpentine.

•
Formula No. 5.

Ingredients.—1 lb. beeswax.
1 lb. suet.
2 lb. gum-arabic (powdered).
8 lb. sugar candy (powdered).
• 1 lb. ivory-black.
1 lb. lamp-black.
•

Method of Preparation.—Melt the wax and suet together, stir in the lamp-black and ivory-black, and then mix in the gum and candy, and when cool, but before hardening, put into moulds or stamp out into cakes with die stamp.

Formula No. 6.

Ingredients.—1 lb. beeswax.

1 lb. suet.

2 lb. lamp-black.

10 lb. common glue size.

Method of Preparation.—Melt the wax and the suet together, then stir in the size, and lastly incorporate the lamp-black.

Bottom Washes or Finishes for Soles, Waists, etc., of boots and shoes. White finish for hemlock leathers :—

Ingredients.—1 lb. best white glue.

1½ lb. sulphate of zinc (powdered).

2 lb. sulphate of copper (ground).

1 lb. sulphate of magnesia.

1 lb. pipeclay (bolted).

2 oz. light yellow ochre

4 gallons water.

2 lb. oxalic acid.

gum tragacanth mucilage, q. s.

Method of Preparation.—Soak the glue in 1 gallon of the water, in a second gallon of the water stir up the pipeclay and the yellow ochre (having previously mixed them together by sifting), and in the remainder of the water dissolve the sulphate of zinc, copper and magnesia, and when each compound is prepared, mix them all together, and put in a vessel and raise the whole to the boiling-point, then dissolve the oxalic acid in the mixture, and finally add as much gum tragacanth mucilage as will make the mixture adhere to the leather when put on with brush or sponge. The leather should be buffed before applying the finish, and if the colour

is very red, a second application should be given after the first has dried.

Buff Finish for Soles and Waists of Boots and Shoes :—

- *Ingredients.*—45 oz. pale chrome yellow (Paris chrome).
 9 oz. chromate of lead (medium).
 78 oz. pipeclay.
 31 oz. alum (powdered).
 31 oz. quercitron.
 45 fluid oz. of sulphuric acid.
 7 pints gum tragacanth mucilage.
 7 gallons water.

Method of Preparation.—Mix the sulphuric acid with the gum tragacanth mucilage, and sift the solid ingredients together in the state of powder, then grind this mixture in the water to form a paste, and finally mix in the acidified gum solution, and boil the mixture for a quarter of an hour, then allow to cool, and for use apply in paste form, or else evaporate to dryness, and put up in powder for use as wanted; this powder is used by making it into a paste with a little water, and applied to the sole leather in the usual way by the boot finisher.

•
A Cream Finish for Sole Leather, Boot Tops, etc. :—

- Ingredients.*—1 lb. French chalk or talc.
 8 oz. oxalate of potash.
 1 lb. flake white (dry carbonate of lead).
 ½ lb. burnt alum.
 1 lb. cuttlefish bone (powdered).
 • 1 lb. precipitated sulphate of barium.
 3 oz. chloride of tin solution.
 2 gallons barley water.

Method of Preparation.—Mix and incorporate by boiling all these ingredients in an earthenware vessel for five or ten minutes.

*Cream White Sole Finish :—**Ingredients.*—72 oz. French chalk.

6 oz. yellow ochre.

1 gallon water.

 $\frac{1}{4}$ gallon gum tragacanth mucilage. $\frac{1}{2}$ fluid oz. concentrated solution of oxalic acid.

colouring matter (common laundry blue).

*A very White Bottom Wash :—**Ingredients.*—1 lb. French chalk. $\frac{1}{2}$ lb. common chalk.

8 fluid oz. methyated spirits.

 $\frac{1}{4}$ gallon water (coloured sky blue with laundry blue). $\frac{1}{2}$ fluid oz. concentrated solution of oxalic acid.

Method of Preparation.—Mix all the ingredients and boil, then add the gum mucilage sufficient to make a pasty mass. Buff the sole leather, and give two applications of the above finish, allowing the first to dry before applying the second.

*A Waterproof Wax Finish for Sole Leather :—**Ingredients.*—2 to 4 oz. stearine.

6 to 7 fluid oz. benzene.

Method of Preparation.—Dissolve the wax in the benzene, and for use sandpaper the leather, and apply the solution rapidly with a brush, and polish the leather afterwards by slicking. Be careful not to allow the preparation to be used in a room where there is a naked light or fire burning, as the vapour of benzene is very volatile and inflammable, and if it comes in contact with a flame, an explosion of the vapour results.

Boot Powders for Tight Boots.—The powder used by shopkeepers for putting in boots to facilitate the insertion of the foot in same consists of (a) tannic acid, (b) soapstone (which is a variety of talc-steatite), which is naturally white, grey, green, or else artificially coloured by mixing it with a little colouring matter in spirits of wine or oil, and then drying the mass afterwards, so as to obtain the coloured powder in a dry

state. French chalk powdered is also used for the same purpose. These powders are used by sprinkling them in the boot before drawing same on the foot. Silicate of magnesia is also called soapstone owing to its unctuous nature.

Spankum, Bosh, Fake, are the names given by boot finishers to the following compounds, which are used as ready and quick means of finishing boots and shoes. The method of using these compounds is thus. The sole, waist, heel or edges are burnished in the usual way with "burnishing ink," and then the fake is applied with the finger-tip, and when dry it is polished off with a roll of felt, or cloth destitute of "nap". This is the process by which the high black (or colourless) polish is obtained on the soles of cheap leather and waists of gentlemen's boots and shoes. A colourless or "white" spankum is obtained by using heel-ball composition that has been made without any lamp-black or other colouring material. Colour can be given to the composition by staining the turpentine by steeping in it dragon's blood or turmeric for a month.

Ingredients.—20 fluid oz. turpentine.
12 heel-balls.

Method of Preparation.—Melt the heel-balls by heating them in a suitable vessel, and when semi-fluid and not too hot add the turpentine and mix well by stirring with a wooden stirrer. To test the quality of the "spankum," take out a little of the mixture on the stirrer, and drop it on a plate or piece of metal; it should set at once; and if it can be smeared readily by touching with the finger-tips it is ready for use, if not, more turpentine should be added until the desired consistency is obtained.

Another formula is to take equal weights of heel-ball and beeswax and dissolve them in naphtha or methylated spirit.

Solution Wax is a compound used for purposes identical with "spankum"; it is composed of these:—

Ingredients.—16 oz. black pitch.

1½ oz. beeswax.

1½ oz. rosin.

2 heel-balls.

20 fluid oz. boiled oil.

Method of Preparation.—Put into a suitable vessel, and slowly simmer altogether, stirring until a homogeneous mass is obtained. To use in cold weather a large quantity of oil is required.

Shoemakers' Waxes.—

Ingredients.—40 lb. rosin.

4 lb. heavy rosin oil.

4 lb. heavy coal tar oil (free from creosote).

2 lb. chrome yellow.

2 lb. chalk.

Method of Preparation.—Put the rosin into a suitable boiler, and heat it until it melts, then add the rosin oil and coal tar oil, and heat up the mixture until it boils, and continue the boiling until a sample, when taken from the boiler, can be kneaded and drawn out into threads between the fingers; then allow the mixture to cool, and while in a fluid state stir in the chrome yellow and chalk, both in the dry powdered state; mix thoroughly by stirring, and when homogeneous allow to cool until plastic enough to be moulded into suitable sized pieces of "cobbler's wax".

Another formula is to melt together tallow and Swedish pitch, and when plastic to form into balls; the quantity of tallow is best determined by experiment.

Bootmakers' Inks and Stains.—There is a great diversity in the composition of the various inks and blacking fluids used by bootmakers and curriers, each kind of ink being adapted for a particular kind of leather. The following formulæ are those inks which are best adapted to the use of the bootmaker and finisher. Other formulæ will be found in the chapter on curriers' ink stains, dyes, etc.

Finishers' Ink.

Ingredients.—1 gallon water.
 8 oz. logwood extract.
 $\frac{1}{2}$ oz. bichromate of potash.
 $\frac{1}{2}$ oz. gum-arabic.

Method of Preparation.—Dissolve the logwood extract by boiling it in the water, then dissolve the gum in powder, and finally add the potassic bichromate, and allow several days' digestion, with frequent stirring up in a water basin. This is a very good ink for burnishing and staining purposes.

Staining Inks.

Ingredients.—2 gallons water.
 1 gallon vinegar.
 3 lb. gall nuts (bruised).
 1 lb. gum-arabic.
 1 lb. sulphate of iron.

Method of Preparation.—Boil the galls in the water for an hour or two, and dissolve the iron salt in the vinegar, then mix the two fluids and stir in the gum.

Another formula for a similar ink is composed of these—

Ingredients.—6 gallons water.
 2 lb. galls (bruised).
 1 lb. logwood chips.
 1 lb. gum-arabic.
 1 lb. sulphate of iron

Method of Preparation.—Boil together for one to two hours and then strain.

The following formulæ give components which improve the above inks:—

Ingredients (No. 1).— $\frac{1}{2}$ pint of methylated spirit.
 1 oz. glycerine.
 2 oz. extract of logwood.
 $\frac{1}{2}$ fluid oz. olive oil.
 2 fluid oz. chloride of iron tincture.
 $\frac{1}{2}$ oz. gum-arabic.
 6 oz. water.

Method of Preparation.—Dissolve the logwood extract in the spirit by gently heating it, and then add the glycerine, gum and oil in the order named; when these bodies are incorporated add the tincture of iron to the water. For use 1 fluid oz. of this compound is added to 1 pint of the ink, made as above described, to increase the lustre and depth of colour.

Ingredients (No. 2).—1 oz. oil of hemlock.
 2 oz. white Castile soap.
 3 oz. chloride of iron.
 4 oz. extract of logwood.
 6 oz. glycerine.
 8 oz. methylated spirits.
 8 oz. water.

Prepare as in No. 1, and use $\frac{1}{2}$ fluid oz. to the pint of ink.

Burnishing Inks. For Heel and Sole Edges.

Ingredients (No. 1).—1 gallon methylated spirit.
 2 to 4 oz. olive oil.
 8 to 16 oz. extract of logwood.
 8 to 16 oz. tincture of iron.

Method of Preparation.—Mix all together, and shake well before use; burnish with a hot iron at once.

Ingredients (No. 2).—1 gallon water.
 4 oz. extract of logwood.
 1 oz. ferrocyanide of potassium.
 $\frac{1}{2}$ oz. bichromate of potash.

Method of Preparation.—Dissolve the logwood in the water by boiling, then dissolve the ferrocyanide, and lastly the bichromate of potash; stir well and give a few days for digesting. This gives a good quick burnishing ink with hot or cold iron.

No. 3.—Make a solution of shellac by dissolving 2 oz. in 1 gallon of water, to which 1 oz. borax has been added.

boil the water and add the borax, and then put in the shellac, and continue the boiling until dissolved, then add $\frac{1}{2}$ fluid oz. of glycerine, or else $\frac{1}{2}$ oz. gum-arabic solution, or else 1 oz. Castile soap. This fluid is mixed with finishing ink in more or less proportion.

No. 4.—*A Brown Finishing Ink* is prepared by making a strong decoction of black catechu, and adding a little bi-chromate of potash.

No. 5.—*The following Burnishing Ink* is identical with some of the American inks:—

Ingredients.—2 gallons water.

1 $\frac{1}{2}$ lb. logwood extract.

3 oz. shellac.

1 $\frac{1}{2}$ oz. borax.

Method of Preparation.—Dissolve the extract of logwood in 1 gallon of water by boiling it therein, separately dissolve the shellac in the other gallon of water by making the water boiling hot, adding the borax and then stirring in the shellac, and continuing the boiling until the shellac has dissolved. Separately make the following compound: Put half a pound or so of sulphate of iron crystals into a Winchester bottle, and pour on the crystals strong nitric acid just to cover the crystals, and cork up the bottle, and allow the mixture to stand until the crystals are dissolved, then cautiously put in some more crystals of iron sulphate, sufficient to allow some of the crystals to remain in the liquid undissolved. When putting the second lot of crystals into the bottle, avoid inhaling the fumes that are given off, also do not let too much air reach the contents of the bottle; in a few hours' time shake up the bottle, and then pour off the fluid for use. Now, to prepare the burnishing ink, proceed as follows: Take 1 measure of the logwood solution and mix it with 3 measures of the shellac solution, and after stirring up well put in $\frac{1}{16}$ th of a measure of the liquid obtained from the

sulphate of iron crystals, stir well, and expose the mixture to the air in shallow pans or tubs for a few hours, frequently stirring it. On exposure the mixture becomes of a deep bluish black. This ink improves (and thickens) by keeping.

Finishing Ink.

Ingredients (No. 6).—2 gallons water.

6 oz. logwood extract

6 oz. borax.

1½ oz. shellac.

$\frac{1}{3}$ oz. potassic bichromate.

10 fluid oz. water.

3 fluid oz. ammonia.

Method of Preparation.—Dissolve the extract of logwood in 1 gallon of water, and in the other gallon of water dissolve the shellac by boiling it along with the borax, separately dissolve the bichromate of potash in the half-pint of water, then mix all three solutions, and lastly mix in the ammonia.

Ingredients (No. 7).—½ gallon water.

10 oz. logwood extract.

8 oz. nut galls.

4 oz. Castile soap.

½ oz. glycerine.

Method of Preparation.—Boil all the ingredients together in the water.

Black Dressing or Ink.

Ingredients (No. 8).—½ gallon methylated spirits.

6½ oz. shellac.

6 oz. asphaltum.

1 fluid oz. neatsfoot oil.

lamp-black, q. s.

Method of Preparation.—Dissolve the shellac and asphaltum in the spirit, add the neatsfoot oil, and then add sufficient lamp-black to give the required depth of colour.

Ingredients (No. 9).—1 gallon water.

6 oz. logwood extract.

1½ oz. lamp-black.

1 oz. glycerine.

½ oz. bichromate of potash.

1 oz. sulphate of iron.

Method of Preparation.—Boil all together for half an hour.

Shellac Ink.

Ingredients (No. 10).—Shellac.

Borax.

Aniline black, soluble in water.

Water, q. s.

Method of Preparation.—Dissolve 3 oz. of borax in 1 gallon of water, and then set this on to boil, and add sufficient aniline black (about 1 oz.) to colour it, boil ten minutes and then put in 5 oz. shellac, and continue boiling until dissolved; if not quite black enough, add a little more nigrosine.

Ingredients (No. 11).—16 oz. logwood chips.

1 gallon water.

½ oz. bichromate potash.

8 oz gum-arabic.

Method of Preparation.—Boil the logwood chips in the water for half an hour, then strain and put in the bichromate of potash, and after boiling for five minutes allow it to cool, and then put in the gum mucilage (made by dissolving the gum in just sufficient water to dissolve it); the ink is then ready for use.

Waxes for Sewing Soles, etc.

Ingredients.—10 oz. pitch.

10 oz. rosin.

1 oz. tallow.

Method of Preparation.—Melt together, and when cool enough pull it until it assumes a pale brown colour; this

pulling effects a partial bleaching of the wax, whereby the black colour of the pitch is decreased.

Wax for Sewing Machines.

Ingredients.—4 lb. rosin.
1 lb. pitch.
 $\frac{1}{2}$ lb. beeswax.
3 oz. tallow (refined).
3 oz. sperm oil.

White Wax for Waxing Hemp Sewing Threads, etc.—Mix together by heating equal weights of—

Virgin wax.
Rosin.
Flake white dry powder.

Method of Preparation.—Melt the wax and rosin together first, and then stir in the white pigment.

Dubbin.

Ingredients (No. 1).—1 gallon boiled linseed oil.
4 lb. mutton suet.
3 lb. yellow beeswax.
2 lb. common rosin.

Method of Preparation.—Melt all together by heating; for use warm the leather, and rub in the dubbin until the leather is saturated. It is suited alike for soles and uppers of winter boots.

Ingredients (No. 2).—1 gallon linseed oil.
1 lb. beeswax.
16 oz. turpentine.
4 oz. Burgundy pitch.

Method of Preparation.—Melt all together and use as in No. 1.

Ingredients (No. 3).—1 gallon train oil.
1 lb. tallow.
2 lb. rosin.

Method of Preparation.—Melt the rosin and tallow together, and while hot mix in the oil and stir until cold.

Edge Stains for russet leathers, reins, belts, straps, etc.

Ingredients.—5½ oz. annotta,

8 fluid oz. liquid ammonia.

50 fluid oz. water.

Method of Preparation.—Dissolve the annotta in the liquid ammonia for twenty-four hours, and then add the water and boil until the mixture is reduced to half its original bulk. A shellac varnish laid on the stained part after it is dry preserves the stain from discoloration. For directions for polishing edges of straps, etc., see chapter on Useful Information.

Orange Stain.—Dissolve chrysoidine in alum water.

Brown Stain.

Ingredients.—1 gallon water.

8 oz. oxalic acid.

8 oz. hydrochloric acid.

½ oz. cochineal insect (bruised).

Method of Preparation.—Boil altogether and strain.

Red Stain.

Ingredients.—½ gallon water.

8 oz. cochineal (powdered).

1 quart liquid ammonia.

Method of Preparation.—Steep the cochineal in the water boiling hot for some hours, then add the ammonia, and after heating for some time, strain for use.

Crimson Stain is obtained by the aid of alum or tin salts laid on the leather, and then an application of a decoction of cochineal given.

A Brown-yellow Stain.—Boil Brazil wood in a solution of soda and water, and separately make a decoction of weld

(dyers' weed), and mix the two solutions in the proportions which give the tone of colour desired. The above stains, although especially adapted for edge stains, may also be used as staining fluids for colouring skins (see chapter on curriers' dyes, stains, etc.).

Glue Paste for Skins.—The flesh side of belt, strap, rein, etc., leather is rendered smooth by putting on it a compound of glue and flour paste. In the chapter on curriers' seasonings, etc., will be found formulæ for preparing curriers' pastes and sizes, but the following compound is one that can be made and sold by the leather factor ready for use:—

Method of Preparation.—Put rye flour into a pan or basin, and pour on it a boiling hot solution of water in which a little glue size (1 oz. size per pint of water) has been dissolved, stir the flour while pouring on the water, so as to make the mixture into a dough not quite so stiff as for puddings or pastry, stir or beat the dough for four or five minutes, then put a cloth over the pan, and allow it two days' rest. It is laid on the flesh side of the leather with a stiff brush, and smoothed down by slicking with a copper slicker, or else put under a rolling machine.

Waterproofing Compound.

Ingredients.—1 lb. common dubbin.

1 pint raw linseed oil.

1 pint india-rubber solution.

Method of Preparation.—Dissolve by slow digestion in a warm place.

Waterproof Cement for Bootmakers.

Ingredients.—1 lb. gutta percha.

‡ lb. india-rubber.

2 oz. pitch.

1 oz. shellac.

2 oz. olive oil.

Method of Preparation.—Melt all together and use the cement hot.

Shoemakers' Paste.

Ingredients (No. 1).—1 gallon water.

1 oz. alum (powdered).

rye or wheat flour.

1 oz. rosin (powdered).

Method of Preparation.—Dissolve the alum in the water, and gently heat the water so that it is just tepid, then mix in sufficient flour to make of a creamy consistency, break up every lump of flour, and then put the mixture into a steam-jacketed kettle, and heat it until the paste boils, then add the rosin, and continue heating and stirring until it becomes a stiff paste, then allow to cool and put in stone jars covered with a lid.

Ingredients (No. 2).—4 lb. good glue.

15 lb. water.

6 to 8 gallons water, boiling hot.

30 lb. starch.

20 lb. cold water.

carbolic acid or oil of cloves, q. s.

Method of Preparation.—Soak the glue in the 15 lb. of water for twelve hours, then slowly heat until the glue has dissolved, and add 6 or 8 gallons of water. Separately rub the starch up in the cold water, so as to form a creamy mass. Heat the glue solution until it boils, and then while boiling slowly pour in the starch solution, and stir all the time, then add sufficient carbolic acid or essential oil of cloves to prevent the mass fermenting (i.e., becoming sour or mouldy; 1 to 2 oz. of either of these substances will be sufficient).

Shoemakers' Paste for Stiffeners.

Method of Preparation.—Mix dextrine with cold water to form a paste of a suitable consistency.

Composition for Sole Leathers.

Ingredients.—2 gallons rye flour paste.
2 gallons gum tragacanth mucilage.
1 lb. American isinglass.
1½ lb. oxalic acid.
¼ lb. gamboge.^f
3 lb. pipeclay.
water sufficient to make 10 gallons.

Method of Preparation.—To incorporate these ingredients make the flour into a paste in the usual way, then add the isinglass, and stir until dissolved; when cold mix in the oxalic acid, gamboge, pipeclay and water, and give a week's rest before using.

Bleaching Compound for use with tanned leathers.

Ingredients.—20 gallons water.
2 oz. tartaric acid.
2 oz. hydrochloric acid.
2 oz. cream of tartar.
2 oz. bisulphite of soda.

Method of Preparation.—Steep the leather for two hours in the fluid.

CHAPTER IV.

CURRIERS' SEASONINGS, BLACKING COMPOUNDS, DRESSING FINISHES, GLOSSES, ETC.

THE method by which the currier colours his leathers black depends on the nature of the leather under treatment, and the purpose for which it is to be used. Thus, for example, kip and calf leather for the uppers of men's boots are blacked by rubbing the grain side of the leather with a compound composed of soap and lamp-black, and the operation of blacking such leather is called "snutting". Other kinds of leather, such as glacé, French kid, etc., are blacked by subjecting the grain side of the leather to the action of a seasoning fluid which is usually a compound of iron, logwood, vinegar, etc., while the blacked leather is further treated with finishing dressings to give them a gloss or glazed appearance. These finishes or dressings vary to a great extent according to the currier's knowledge and experience. The purport of this book does not permit of full working instructions being given in the blacking process of any kind of leather. Such operations are pretty well known to curriers. What, however, is given in the present chapter is instructions for preparing the various compounds used by curriers in blacking and finishing black leathers. As each individual currier has his own pet formula for his seasoning vinette, gloss, "finish," etc., the formulæ herein given will enable him to make a selection of some one or other recipe which is better than his own pet formula. As far as possible

instructions for using the compounds named in this chapter, will be given, but any deficiency in such respect will be easily supplied by the currier from his own individual experience. Further instructions concerning the compounds used by curriers will be found in the chapter on dyes and stains for leather.

The leather, as the currier receives it from the tanner, is dry, harsh, and not flexible; it is said to be "in the crust". The skin, in fact, is partly denuded of its natural gelatine during the processes it has undergone at the tanner's hands. Leather "in the crust" is not at all in a condition suited to be coloured for use in any of the arts. Consequently the first operation the currier has to do is to replace the natural gelatine with some substance that will fill the pores, and so render the leather tough and elastic and water-repellent. There are several compounds used for this purpose, their use being dependent on the particular kind of leather under treatment. The "stuffing" compound in general consists of oil and tallow, and to make it penetrate the leather the skin "in the crust" is first damped with water, so as to temper them, and then after they have been rolled up grain side in, they are beaten to render them soft, and the stuffing compound worked into the skin by applying it to the flesh side by means of a brush, the stuffing compound being used hot. This process is called "hand stuffing," which, it is needless to say, is a very tedious, laborious, and therefore expensive operation. By means of machinery, however, the skin can be stuffed at a much quicker and cheaper rate.

The kind of machinery in use for stuffing generally consists of a revolving drum or stuffing wheel, the interior of which is first made hot by the injection of hot air or steam, and then the skins introduced along with the stuffing compound (an oleaginous mixture of some sort), and the wheel made to revolve, then, by the combined action of the

tumbling process to which the skins are subjected and the heat, an absorption of the stuffing compound occurs, whence the skins are thus ready for the next currying process.

The following formulæ are representative of the various stuffing compounds that are used for stuffing skins for upper leathers.

Stuffing Compounds.

Ingredients (No. 1).—1 gallon linseed oil.
1 gallon neats-foot oil.
½ lb. wool tar creosote.
10 lb. tallow.
1 lb. beeswax.

Method of Preparation.—These materials are put into a suitable heating vessel and heated over a slow fire until they boil or attain the highest degree of heat without igniting, then small quantities of this mixture are taken out in a scoop or dipper, and poured carefully into a vessel containing crude or common wood tar, and the mixture stirred or otherwise agitated so as to ensure an amalgamation of the tar with the oily compound. After the creosote becomes warmed and softened, quickly and at once pour in the whole of the remainder of the boiling oil, which has previously been made ready for the purpose, and mix the entire mass thoroughly until there is a complete mingling of the whole. Before the mixture cools, again put it into an iron caldron, and subject it to a slowly increasing heat until it boils, being careful to avoid ignition; then draw the liquid off into a vessel, and let it stand until it becomes cold, when it is ready for use.

Stuffing Compound (chiefly useful for sheep and goat skins).

Ingredients (No. 2).—33 parts paraffin wax.
33 parts rosin.
24 parts rosin oil.
10 lb. tallow.

Method of Preparation.—Put the paraffin into a steam-jacketed kettle and melt it, then put in the rosin oil and tallow and heat until thoroughly melted and heated to about 220° F., then allow it to rest until clear and bright, when it is ready for use. It is also suited for stuffing calf skins. Some curriers prefer to use fish oil in place of the tallow.

Ingredients (No. 3).—33 parts paraffin wax.

33 parts rosin.

14 parts rosin oil.

10 parts common wood tar.

10 parts tallow or fish oil.

Method of Preparation.—Prepare as directed for No. 2. The proportion of the several ingredients named in Nos. 2 and 3 may be varied at will, but it is best to use the paraffin in not less than 25 parts.

Ingredients (No. 4).—5 parts egg (yolk and white).

14 parts glycerine.

12 parts neatsfoot oil.

6 parts tallow.

Method of Preparation.—First mix the white and yolk of egg with glycerine in the proportion of 5 parts of egg albumen to 4 of glycerine (this compound is termed "glycerole" of egg). Next mix 3 parts of glycerole of egg with 5 parts of glycerine, and separately mix 4 parts of neatsfoot oil with 2 parts of tallow warmed to the consistency of oil, then mix the two compounds, and continue to stir until quite cold and stiff.

Ingredients (No. 5).—1 part paraffin wax.

2 parts wool grease.

tallow, q. s.

Method of Preparation.—The paraffin is melted and the wool grease incorporated by stirring. Wool grease is an oleaginous compound which is obtained from the washing

and scouring of sheep wool; it consists of the oily matter which is removed from the wool and the soap that has been used in extricating same. The proportion may be varied, using less paraffin wax if the stuffed leather is too hard, and more of it if the finished stock be too soft.

Ingredients (No. 6).—3 parts English wool grease.
1 part brown grease.

Method of Preparation.—Mix by melting in a steam-jacketed kettle. The brown grease above referred to is made of tanners' whittings, tallow grease, trimmings of finished leather, and the gatherings of stearine from the flesh of hand-stuffed leathers. Another compound which is called brown grease (also called Yorkshire grease) is obtained from the woollen mills; such grease, however, is used more in the soap-making industry than in leather stuffing. It is not our intention to describe the various currying operations, as curriers themselves do not want to be instructed in their own work. Suffice it to say that after the stuffing operation the next stage is that of setting out and whitening, after which the blacking and colouring of the skin can be proceeded with. It is outside the scope of this work to enter into details concerning the different methods of blacking upper leather, therefore the following formulæ are not put in any order, the heading to each compound being sufficient to indicate to the currier the chief use for which the compound is valuable.

Seasoning for Oil-Grain Leathers.—This is sometimes called "sig". It is a fluid which is put on the skin, so as to dye or stain it, or otherwise prepare it for being blackened on the grain side. It is usually applied with a stiff brush, and the skin well soaked with it, so that the purple shade at first observable changes to a brown as the grain becomes saturated with the sig liquor. The liquor should not be allowed to

penetrate to the flesh side, but it should be well rubbed in the grease, so as to cut the grease, and then prepare the surface to receive the blacking compound, the latter being applied in the cold state.

Sig Liquor.

Ingredients.— $\frac{1}{2}$ bushel logwood chips.

2 oz. washing soda crystals.

Method of Preparation.—Put the logwood chips and the soda into a bag, and suspend the bag in a barrel or vat, cover with water in such a way that steam may be directed into it; the heat of the steam will extract the goodness from the chips, and as the steam condenses a liquid extract will be formed; this can be strengthened by lowering the bag into the liquor now and again, and also by adding fresh chips daily.

The *Blacking Compound* for the leather that has been seasoned with the above sig liquor is prepared as follows:—

Ingredients.—9 lb. sulphate of iron.

4 oz. sulphate of magnesia.

6 oz. acetic acid.

1 oz. nutgalls.

40 gallons water.

Method of Preparation.—Dissolve the ingredients in a few gallons of water by boiling, and then add the remainder of the water. This blacking is laid on the seasoned leather with a soft, long-haired brush, giving two to three applications, and then the skins are first hung up for a few minutes to dry, taken down and folded grain side (i.e., blackened side) in, and put in a pile to ripen for the further process of pebbling or graining. Instead of the above blacking compound any of the following liquids may be used:—

Vinegar Black (Vinetto).

Method of Preparation.—Put iron turnings (free from grease) into a wooden vat or tub, and cover them with malt

vinegar or cider vinegar, heat up the mixture and let it rest for a couple of weeks, then pour off the fluid, allow any sediment to settle, and put in bottles for use as wanted.

Vinegar Black.

Ingredients.—1 gallon good vinegar.

1 lb. lamp-black.

2 lb. iron filings.

Method of Preparation.—Digest together for three weeks with frequent stirring.

Iron and Logwood Black.

Ingredients.—11 lb. sulphate of iron.

5 lb. tartaric acid.

9 gallons water.

16 lb. logwood chips.

18 gallons water.

2 lb. grape sugar (glucose).

4 lb. naphthol black.

Method of Preparation.—Dissolve the iron sulphate and tartaric acid in the 9 gallons of water, and allow to settle, then draw off the clear fluid. Separately boil the logwood in the 18 gallons of water for an hour or two, then strain the fluid and dissolve in it the naphthol black, and finally mix in the iron solution. For use, grease in the leather is cut by brushing over with a solution of soda or ammonia, and then applying this seasoning black in the usual way with a brush.

Iron Liquor.—The colours obtained on leathers from this body vary considerably in depth and shade of colour; if the iron salt be too strong a greyish-black tone is obtained, while the previous application of a moderately strong fluid such as soda, alum, logwood, etc., effect totally different results in the colour obtained. The fluid obtained from the ingredients named below acts very powerfully, and should be used only in a dilute form. This liquid is much used in dyeing wool, cotton and other textile materials.

Method of Preparation.—Put into an earthenware pan out in the open air some nitric acid of 64° Tw., and dilute this with water until of half the strength, then put in some clippings or turnings of sheet iron, free from grease, add these a few at a time while they continue to be dissolved with the escape of ruddy fumes (by all means avoid inhaling these fumes, as they are very irritating to the lungs and poisonous). When these orange-coloured fumes cease to arise do not put in any more iron. The finished product should stand at about 43° or 44° Tw.

Sometimes ferric sulphate (a persulphate of iron, or red sulphate) is used, in which case the iron liquor is prepared by adding to a solution of copperas half as much sulphuric acid as it already contains (i.e., 18 per cent. oil of vitriol), and heating the mixture, adding from time to time small quantities of nitric acid to peroxidise the iron.

For producing certain tones of colour either of the following compounds are employed:—

Ingredients (a).—15 gallons water.

24 lb. refined nitrate of soda.

20 lb. sulphuric acid.

scrap iron as required.

Ingredients (b).—13 gallons water.

16 lb. nitrate of soda.

20 lb. sulphuric acid.

scrap iron as required.

Method of Preparation.—The soda nitrate is first dissolved in the water, and then the acid and iron added by degrees, being careful not to allow the heat of the mixture to become too hot. Do not make more than is required for use, as the liquor deteriorates in keeping. The soda nitrate should be free from chloride of sodium.

Basic Sulphate of Iron.—The following process produces a liquid iron liquor which is very useful in colouring leather of various tannages.

Ingredients.—Nitric acid.

Sulphate of iron (ferrous sulphate, or green vitriol or copperas).

Method of Preparation.—Put some crystals of sulphate of iron into a stoneware jar, or large glass bottle, and cover them with some nitric acid until the crystals have dissolved; gradually add more crystals until they cease to dissolve, keep the jar covered, so as to prevent the access of air and escape of ruddy fumes (avoid inhaling these fumes), and when all the acid has become saturated with the iron salt, pour off the fluid for use, and proceed to make a fresh quantity by pouring more acid on the crystals, and adding fresh crystals as required. For use this liquid is diluted more or less with water.

Commercial "Black Liquor" has a specific gravity of 18° to 20° Tw. It possesses an olive-green colour, a peculiar tar-like smell, and an inky taste. It is made by treating iron scraps with pyroligneous acid. Such liquor is sometimes made by mixing together solutions of acetate of lime or sugar of lead, and of green copperas, and after letting the mixture stand to settle, drawing off the clear fluid for use.

Black Finishes or Dressings.—After the leather has been blacked by the application of "seasoning," vinette, etc., it is necessary to apply a dressing or finishing black so as to impart a good appearance to the leather when finished ready for sale. The following compounds will indicate the lines on which these products are made:—

Black Finish.

Ingredients (No. 1).—8 oz. gelatine.

8 oz. indigo.

16 oz. logwood extract.

64 oz. crown soap.

128 oz. softened glue.

4 gallons vinegar.

Method of Preparation.—Heat all these ingredients together* until thoroughly mixed, lay on with a soft brush, and polish by rubbing with a woollen cloth or under the glazing or rolling machine.

Ingredients (No. 2).—1 gallon water.
 1 lb. logwood extract.
 1 oz. sulphate of iron.
 $\frac{1}{2}$ oz. bichromate of potash.

Method of Preparation.—Digest all together.

Black Finish (Levant Ink).

Ingredients (No. 3).—1 gallon water.
 2 oz. logwood extract.
 $1\frac{1}{2}$ oz. sulphate of iron.
 4 oz. gall nuts (crushed up).

Method of Preparation.—Mix by heating all together.

Black Finish for Enamelled Leather.

Ingredients (No. 4).—1 lb. ivory-black.
 1 lb. lamp-black.
 1 lb. indigo (powdered).
 6 lb. gum-arabic (dissolved in water).
 8 lb. brown sugar.
 $\frac{1}{2}$ lb. glue.
 2 gallons water.

Method of Preparation.—Soak the glue in the water, then dissolve the sugar, afterwards mix in all the other ingredients, and heat up until homogeneous, allow it to boil a few minutes and then stir until cold.

Black Finish for Harness Leather.

Ingredients (No. 5).— $\frac{1}{2}$ gallon vinegar.
 1 oz. isinglass.
 1 oz. indigo.
 1 lb. logwood extract.
 $\frac{1}{2}$ lb. soft soap.
 1 lb. glue (softened by soaking in water).

Method of Preparation.—Mix and heat up to boiling point, then strain, and when cool it is ready for use.

Black Finish for Harness Strap Leather.

Ingredients (No. 6).—1 lb. black rosin.

1½ lb. beeswax.

¼ lb. lamp-black.

½ oz. indigo.

turpentine, q. s.

Method of Preparation.—Melt the rosin and beeswax together, then mix in the black and blue pigments, allow to cool somewhat, and then thin down to a suitable consistency with the turpentine; give a coating by means of a rag, and polish by brushing with a soft brush.

Finishing Dressing to give a Bright Polish.

Ingredients (No. 7).—1 gallon water.

8 oz. extract of logwood.

2 oz. ferrocyanide of potash (yellow prussiate).

½ oz. bichromate of potash.

bullock's blood.

Method of Preparation.—Dissolve the logwood extract in the water by boiling, then put in the yellow prussiate, and lastly the bichromate of potash. For use mix equal measures of this compound and fresh bullock's blood. The finish is laid on with a horse-hair brush, rubbing it well into the pores of the grain, then evenly distribute the dressing by going over the surface with a sponge, and hang up until they are fully dry. The next step is to give a final finish of some oil or oleaginous compound.

Solid Blacking Compounds.—Calf, kid, and other stout leathers for boot uppers are blacked by "smutting," that is, a coating of lamp-black mixed with soap is well rubbed into the flesh side by means of a short-haired brush. In some

leather factories this blacking operation is performed by machines. These blacking compounds are applied to the flesh side of the leather.

Formula for "Smutting" Compound for Flesh Blacking.

Ingredients (No. 1).—1½ gallons water.

2½ lb. potash.

2½ lb. lamp-black.

½ gallon fish oil.

Method of Preparation.—Dissolve 2 lb. of the potash in 1 gallon of water by boiling for an hour. Separately mix the remainder of the potash and water together, and stir in the lamp-black until it is well mixed, and mix this compound with the gallon of potash lye, and boil up for a quarter of an hour, then put in the oil and stir into the mixture, and let it cool, when it is ready for use.

Formula for Finishing Compound for Upper Leathers.

Ingredients (No. 2).—1 gallon water.

6 oz. borax.

1½ lb. shellac.

1 gallon water.

6 oz. extract of logwood.

½ pint water.

3 drachms bichromate of potash.

3 or 4 oz. strong liquid ammonia.

Method of Preparation.—Dissolve the logwood extract by boiling it in one gallon of water, and separately dissolve the borax in the second gallon of water, and then get it on to boil, and while boiling put in the shellac, and boil till dissolved. Separately dissolve the potash bichromate in the half-pint of hot water, then mix the logwood and shellac solution together, and while still warm, put in the bichromate of potash solution, and allow the mixture to stand for some hours, skim off the bluish-grey scum, and

then put in the liquid ammonia, and put in bottles tightly corked.

Finishing Compound for Split Leathers.—This compound is for finishing the inner side of split leather, and imparting to it the appearance of the grain side of kip leather.

Ingredients (No. 3).—1 gallon boiled linseed oil.

16 lb. glue.

8 oz. vermilion, flake white, yellow ochre, or
some other suitable colouring pigment.
water.

Method of Preparation.—Soak the glue in twice its weight of water for twelve hours, then pour off superfluous water, and melt the glue by boiling it in a proper glue kettle (steam-jacketed boiler), stir in the oil, and when well mixed add the pigment. For use this compound is laid on the flesh side of the leather by means of a brush, giving two or more applications, and allowing each one to dry before applying the next, and after each coat is applied put the leather through the glazing machine, and finally "board" it.

Finishing Compound for flesh side of calf leathers for belts, straps, etc.

Ingredients (No. 4).—11 quarts water.

2 lb. Paris white.

$\frac{3}{4}$ lb. curd soap (white toilet soap).

white of 12 eggs.

Method of Preparation.—Cut up the soap and dissolve it with water, and put in the egg albumen, and finally stir in the Paris white. For use this compound is laid on the flesh side after the grain side has been dyed and finished. The flesh side is first pumiced, and then coated with the above compound, and then when dry is smoothed with glass or sandpaper. The above ingredients are sufficient for

twenty-four calf skins. If the coated side of the skin be rolled under the machine, then a smooth surface is obtained.

An Oil Finish for Grain Side of Black Upper Leathers.

Ingredients (No. 5).—1 gallon paraffin oil.

1½ lb. brown grease.

Method of Preparation.—Put the grease and oil into a suitable boiling vessel, and heat it to 100° F., and for use apply the compound by means of a swab or sponge, giving more to the thicker part of the skin (shoulders and butt portions), and hang it up in the finishing room at the above temperature until the grease is well absorbed, and then pack in piles grain side to grain side, and if after a day or two some of the skins show a "hungry" feel on the surface, give another application of the "oiling off" compound.

Soap Blacking Compound for Flesh Side of Upper Leathers.

Ingredients (No. 6).—12 lb. neatsfoot oil.

6 lb. tallow.

1 lb. lamp-black.

Method of Preparation.—Mix up the lamp-black in the oil, and then having melted the tallow, stir in the lamp-black and oil mixture, and stir until cold, when it will be fit for use.

Crown Soap Black.

Ingredients (No. 7).—1 lb. beeswax.

1 lb. crown soap.

2 oz. indigo.

4 oz. ivory-black.

30 oz. turpentine.

Method of Preparation.—Dissolve all together by heating slowly, and stir until cold.

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Compound for Pasting Upper Leathers.

Ingredients (No. 8).—1 gallon flour.
2 lb. hard brown soap.
1½ oz. tallow.
1 oz. beeswax.
• water, q. s.

Method of Preparation.—Make the flour into a paste, and then having cut up the soap, tallow and wax, boil them with the flour paste until they are dissolved, and then the compound is ready for use. This compound is laid on with a brush, and when dry smoothed down by rolling it or “glossing” it.

Size Paste.

Ingredients (No. 9).—1 lb. good glue or gelatine.
2 oz. tallow.
water, q. s.

Method of Preparation.—Soak the glue in water for several hours, then pour off unabsorbed water, and melt the glue by heating it, and while boiling hot put in the tallow, and finally dilute with water sufficient to make the whole of the desired consistency; apply with a sponge.

Soap Black for “Smutting” Upper Leathers or “Splits”.

Ingredients (No. 10).—1 gallon water.
1½ lb. soap.
1 lb. lamp-black.

Method of Preparation.—Dissolve the soap in the water by boiling, and then mix in the lamp-black. The above “smutting” compound is finished by “oiling off” or “gumming” with a mixture of gum tragacanth and neatsfoot oil. Sometimes a solution of gum tragacanth alone is used.

Stuffing Compound for “Splits”.

Ingredients (No. 11).—9 lb. brown grease.
1 lb. English wool grease (or else a mixture of tallow and stearine).

Method of Preparation.—Heat up together in a steam-

jacketed boiler. For use this stuffing compound is put into the wheel or drum with the "splits" in the proportion of 1 lb. of the stuffing grease per lb. of dry leather. Heat up the inside of the stuffing wheel to 140° F. before putting in the "splits," and give half an hour's drumming; the operator knows by experience when the leather has absorbed sufficient of the stuffing compound or not.

Flour Paste for "Splits".

Ingredients (No. 12).—1 gallon flour.

1 lb. common laundry soap.

2 lb. tallow.

water, q. s.

Method of Preparation.—Make a dough of the flour by stirring it into a tub with a little water, and then thin down this batter by the addition of more water until of a creamy consistency, stirring up with a stick or spoon until all lumps are smoothed out (use cold water), then cut up the soap and tallow in small pieces, and put them in the flour and water mixture, and heat the compound in a steam-jacketed boiler until all the compounds are well incorporated, and the mixture of a thick jelly-like consistence.

No. 13.—*Gum Tragacanth Mucilage* is prepared by dissolving 1 lb. of gum tragacanth in 5 gallons of water, allowing the gum to digest for three or four weeks, with a daily stir up of the mixture; for use all white lumps (i.e., undissolved gum) should be picked out or else the mucilage strained. Gum tragacanth takes a long time to dissolve in water, several days in fact, but there is now on the market a gum tragacanth in powder form which does not occupy so long in dissolving. The gum can be caused to dissolve at a quicker rate if the water be acidulated with sulphuric or oxalic acid (1 oz. to 1 gallon of water) before putting in the gum. But for some purposes the presence of these acids are objectionable, particularly so if the gum tragacanth

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mucilage is required to be mixed with neatsfoot or other oil for "oiling off" or "gumming" purposes.

Gum tragacanth is frequently known as gum dragon.

No. 14.—A *Good Oil Finish* for "oiling off" is made by 7 parts of cod oil with 3 parts of paraffin oil (all parts by measure), while for the final gumming a mixture of 7 parts of gum tragacanth mucilage and 3 parts of flour paste are sometimes used, the gumming compound being reduced to a suitable consistency with water so as to form a creamy consistence.

Curriers' Size.

Ingredients (No. 15).— $\frac{3}{4}$ gallon glue size.

$\frac{1}{2}$ pint soft soap.

$\frac{1}{2}$ pint stuffing grease.

$1\frac{1}{2}$ pints sweet milk.

Method of Preparation.—Boil the size in a steam-jacketed kettle, and then put in the other ingredients, and heat until homogeneous, then strain.

Seasoning Black for Imitation Goat.

Ingredients (No. 16).—2 gallons hot water.

7 lb. sulphate of iron.

3 lb. gambier.

1 oz. nutgalls.

Method of Preparation.—Boil all together, and then dilute with 40 gallons of water.

Dressing for Imitation Goat.

Ingredients.—1 gallon of water.

$\frac{1}{2}$ lb. extract of logwood.

$\frac{1}{2}$ oz. bichromate of potash.

2 oz. yellow prussiate.

3 quarts fresh beef blood.

The above compounds are used in the currying of stout upper leathers, those which follow are curriers' compounds used in the production of light and fancy leathers, such as

the conversion of goat, sheep, etc., skins in morocco, imitation roan skins, bag, purse, bookbinders' leathers, etc.

Scar Paste.—This compound is used for covering up cuts, scratches, warble marks, etc., on the grain side of skins.

Ingredients.—5 oz. gelatine.
 40 fluid oz. cold water.
 4 oz. extract of logwood.
 $\frac{1}{2}$ oz. bichromate of potash.
 $\frac{1}{2}$ oz. carbonate of potash.
 $\frac{1}{2}$ oz. sulphate of potash.
 2 quarts of water.

Method of Preparation.—Dissolve the gelatine in the cold water by first soaking it therein, and then gently heating it, and in the 2 quarts of water put all the other ingredients, and dissolve them by boiling the mixture, then mix this fluid with the gelatine solution, and stir until thoroughly mixed and it begins to congeal. When cold it should be of a jelly-like consistency. Moisten the damaged part of the skin, and then lay the scar paste on with a sponge.

Compounds for Preparing Enamelled and Patent Leathers.

Ingredients.—14 gallons linseed oil.
 10 lb. white lead (dry powder).
 10 lb. litharge (dry powder).

Method of Preparation.—Heat these ingredients together until the compound is reduced to the consistency of syrup, and then mix in chalk or yellow ochre. This compound is spread on the hide with a steel tool called a railike, the hide being stretched on a light framework of wood. The frames holding the hides are then placed on racks in a drying closet, with the coated side downwards. The drying closet is heated by steam pipes, and when all the frames are filled with the prepared hides the steam is set circulating through the pipes. The steam to each drier is controlled by a suitable valve.

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and when it is desired to admit the heat to the drier, the door is placed to the larger front opening, and the valve opened so as to give a temperature of about 80° F. to the interior of the drier, and from this point the heat is gradually increased to 160° F., which is about the greatest heat that the fibre of the leather will stand without injury. If it is desired to subject the leather to heat greater than 160°, the fibres are protected by saturating the leather with a solution compound of

2 oz. alum.
2 oz. borax.
1 gallon water.

The leather is immersed in the above compound for about two hours, and when nearly dry it is stretched in the usual manner on frames, and after japanning it is placed in the oven, as has been described, and the heat can be gradually increased from about 80° to 230° or 250° F.; the leather is kept in the driers for six to ten hours, or until the composition is completely matured, and the surface perfectly dry; the borax prevents the recrystallisation of the alum. The next step consists in smoothing the surface of the ground mass by rubbing it with pumice stone; the ground mass is then coated three to five times with a compound of linseed oil and ivory-black, thinned with turpentine sufficient to allow it to flow evenly over the surface; the hide is dried after each application, and every layer but the last one is rubbed over with fine Tripoli powder or pumice stone applied with a piece of flannel.

Enamelling Compound for Patent Leather.

Ingredients (No. 1).—10 lb. linseed oil.
5 lb. thick copal varnish.
½ lb. asphaltum.
10 lb. turpentine.

Method of Preparation.—The asphaltum can be replaced by an equal quantity of Prussian blue or ivory-black, according to the finish desired, the one giving a reddish and the other a blackish tint. The varnish should be kept in the finishing room fifteen to twenty days before being laid on the surface, and the air of the room kept damp and free from dust while the varnish coat is being laid on. The brush used is a long-haired one like a whitewash brush.

Varnish for Preparing Enamelled Leather.

Ingredients (No. 2).—Boiled linseed oil.

Litharge.

Lamp-black.

Method of Preparation.—Boil the oil with the litharge in the proportion of 1 to 2 lb. per gallon of oil, and then mix in sufficient lamp-black to make the mass of the desired consistency.

A Finishing Coat is prepared from—

Ingredients (No. 3).—12 parts shellac.

96 parts methylated spirits.

5 parts Venice turpentine.

2 parts gum sandarach.

1 part lamp-black.

4 parts turpentine.

Method of Preparation.—The solids are dissolved in the spirit, and the turpentine added last of all.

The Composition for Patent Leathers consists of the following. First coat—

1 gallon drying oil.

5 oz. Prussian blue.

Method of Preparation.—Boil to the consistency of thin size, and when cold grind up with a little vegetable-black.

The second coat is like the first, except that a purer Prussian blue is used.

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The third coat has the oil boiled longer, and more of the blue and lamp-black is added.

The final coat is the same, except that it must contain 3 oz. of pure Prussian blue and 4 oz. pure vegetable-black per gallon of oil.

A Good Linseed Oil Varnish for preparing black leather enamel is prepared from the following:—

Ingredients.—60 parts linseed oil.
2 parts litharge.
1 part sulphate of zinc.

Method of Preparation.—Instead of the last two drying compounds, 2 parts of borate of manganese may be used. The oil is heated with the drying compounds for several hours until the fluid strings when pinched between the fingers.

A Flexible Varnish for Leather is prepared by dissolving 4 oz. of asphaltum in 1 gallon of linseed oil, and grinding up 8 oz. of burnt umber in the mixture, and thinning with oil of turpentine, q. s.

Tawing Compound for Horse Leather.—Ingredients for 100 medium-sized skins.

<i>Ingredients.</i> —1½ lb. common salt.	} Dissolved together.
5½ lb. alum.	
9 lb. boiling water.	
14½ lb. wheat flour.	} Make into a paste.
cold water, q. s.	
yolk of 50 fresh eggs.	

Method of Preparation.—Make the paste in small portions with a gradual addition of water until it has become thinly fluid, then add 9 lb. more water to the paste, stirring constantly and vigorously, and finally mix it with the solution of alum and salt (which should be of a tepid temperature). The skins are then placed in a vat, and, after pouring the lukewarm paste over them, worked thoroughly with the

hands to moisten them uniformly. When this is done a thorough penetration of the paste into the skin tissue is effected by a workman with bare feet stepping into the vat and treading the skins slowly but vigorously, by alternate raising of the feet. This treading, for which no suitable mechanical application has thus far been invented as a substitute, is continued until the skins have absorbed most of the paste, which for thin skins will require 1 to 1½ hours, and for thicker ones about 2 hours. The vat is then covered with a clean cloth, and after allowing the skins to rest for 12 to 14 hours, the treading is repeated in order to make them thoroughly smooth and supple. To promote uniform treatment it is recommended to turn the skins occasionally during the treading, and to secure uniformity of the product it is not advisable to subject more than 500 skins to the process at one time. The next step is to stretch the skins so as to free them from spots of adherent paste, and then hanging them up to dry quickly in an airy loft. Olive oil may be used instead of egg yolk. This gives also a very supple and soft leather, provided the workman understands how to divide the oil very finely, and to mix it naturally with the tawing paste. This is done by rubbing together in a mortar such as druggists use 36 oz. of wheat flour with sufficient water, or, better still, thin gum mucilage to form a stiff paste, add to this drop by drop and very gradually, and stirring constantly with the pestle, 10 oz. of the best olive oil, and rub the mass until a sample mixed with a little water separates no globules of fat after continued standing. The mass, the preparation of which is rather tedious, prepared in the above proportions, contains an equivalent of about 100 yolks of eggs, and is mixed with the tawing paste in the same manner. A still more perfect emulsion is prepared by stirring gum-arabic, finely pulverised, instead of wheat flour, into a thick paste with water, and adding to this the oil with con-

stant stirring and rubbing; about 24 oz. of gum-arabic will suffice for 9 oz. of oil.

Substitute for Egg Yolk in Tawing Paste.

Ingredients.—17 oz. fresh almond oil.

17 oz. fresh caseine (curds of milk or cheese).

25 oz. dextrine.

1 oz. borax.

Method of Preparation.—Put the caseine into a stoneware mortar, and having dissolved the borax in a little water, pour that over the caseine; put the mortar in a warm place, and then rub the hot mass until the caseine is almost dissolved and a tenacious liquid, drawing threads, is obtained. Next put in the dextrine, rubbing up the mixture until a uniform paste is obtained, then mix in the almond oil drop by drop, and continue the rubbing for about three-quarters of an hour, until the oil has become thoroughly mixed. The paste thus obtained is diluted with water by slowly adding same, and the previously prepared wheat flour kneaded with it. The above mixture answers as a substitute for 100 yolks of eggs.

Another Substitute for Egg Yolk is obtained by mixing calves' brains with wheat flour, $\frac{1}{2}$ oz. of brain being considered an equivalent for 1 egg yolk. Olive oil can also be used as a substitute for egg yolk, 2 tablespoonfuls of oil being equivalent to 20 yolks of eggs. In such a case very intimate mixture of the yolk of egg with the oil must be effected by adding some flour, otherwise the leather will be spotted.

Tawing Paste for Danish Glove Leather consists of the following (for 12 doz. goat skins):—

Ingredients.—4 $\frac{1}{2}$ lb. alum.

2 $\frac{1}{2}$ lb. common salt.

13 $\frac{1}{2}$ lb. rye flour.

300 yolks of eggs.

Method of Preparation.—Mix together and add birch tar oil (q. s.) to give the characteristic odour of Russia leather.

CHAPTER V.

DYES AND STAINS FOR LEATHERS.

BEFORE the introduction of the coal-tar dyes, the currier had a very limited range of dye materials. He had, in fact, to depend on the dye-woods only for his colours, consequently the range and variety of coloured leather was confined to but a few distinctive colours. By the aid of such materials, however, the currier of those days produced coloured leather that was durable and good. Even when the aniline dyes were introduced, the currier was handicapped in their use, because he found that such dyes did not always give the same resulting hue or colour; sometimes the dye used would yield light shades, sometimes dark ones, and sometimes the colour that resulted from the use of a particular dye liquor would vary according to the nature and tannage of the leather that had been subjected to its action. At the present time, however, leather dyeing by means of the aniline or coal-tar dyes has made vast strides, nevertheless there is still much to learn as regards the production of a particular colour by the aid of a particular coal-tar dye. One very important factor that determines the resulting colour is the strength of the dye liquor, while another very little less important factor is the temperature of the dye liquor at the time of use. When, again, various resulting hues are effected by the preliminary or subsequent treatment of the leather with mineral salts (mordant and topping agents), the exact nature and use of application of both dye and mordant or

striker can be ascertained only by actual practice, as the nature of the tanning process to which the leather has been subjected greatly affects the colour produced. It is only in a limited range that definite instructions can be given, as the dye liquors which will produce a given colour on light leathers (sumach tanned skins) would produce totally different hues on bark or mineral tanned leathers, while in the case of tawed leathers (glove and chamois leathers), a still greater divergence is noticeable. It is only with the dye-wood liquor that fairly constant results can be obtained, owing to the fact that the coal-tar dyes very readily unite and colour organic tissues, the resultant colour being dependent on the strength of the dye liquor. It is advisable never to put the leather into a dye liquor of full strength, because those skins which were first put in would come out much deeper coloured than those last entered in the dye bath, simply because the energetic action in the first instance would have greatly exhausted the dye liquor and left it more or less weakened for the skins put in later on. The plan therefore which gives the best results is to prepare a series of dye baths, either of graduated strength or else all of a uniform strength. By this means uniform results are obtained with the aniline dyes. For example, have a series of three dye baths of equal strength numbered 1, 2 and 3. Put the requisite number of skins into No. 1 bath for the prescribed time, then into No. 2 bath, and finally into No. 3 bath. Now throw away No. 1 dye liquor, and prepare a fresh dye bath of the same strength as the others previously made, and call it No. 4; then with the next batch of skins put them first into No. 2 dye liquor, then into No. 3, and finally into No. 4 dye liquor, reject No. 2 dye liquor, and make a fresh bath, and call it No. 5; then for the third batch of skins first put them into No. 3, then into No. 4, and finally into No. 5 dye liquor; and afterwards reject No. 3 dye liquor, and pre-

pare a fresh bath, and call it No. 6, which is continued in the same series *de novo*. By this method of working the skins are first put into a weak dye liquor, and lastly into a bath of new liquor which gives the finishing colour to the skin. A much more uniform coloration is obtained by this method of working than if a dye liquor of great strength were used direct. Some aniline dyes, if used of too great strength, give a bronze appearance.

The dyer should be careful to put in the skins at one plunge, otherwise those portions which first touch the dye liquor will show a deeper coloration than the portions that remain out longer, if even for a few seconds. By using a series of baths as above described, any unevenness of coloration is corrected in the subsequent or final bath, because by allowing the skins to remain a longer time in them, the skins will become uniformly coloured. After lifting the skins out of the final dye bath they should be washed in plenty of clean running water, so as to remove all superfluous dye liquor, and if any bronze hue appears lightly sponge the dyed side of the skin while rinsing under water. The drying of the dyed skin should be done in the shade (never in the sunlight, as that would cause the colour to fade), and in plenty of dry air. Finally the dyed skin should have a coat of finish (egg albumen or some one of the finishing glosses mentioned in this chapter) laid on the dyed side; this will protect the colour from fading; any striker or topping agent should be applied before the dyed skin is quite dry, and before the finish is applied.

As every dyer knows, the process of staining leather is different to the dyeing of leather. In the latter case, both flesh and grain side of the skin become uniformly coloured. In dyeing skins tanned for morocco it is usual to put them into the dye liquor in pairs, flesh side to flesh side, but even this method does not prevent the flesh side becoming more

or less coloured. It however effects a saving of dye liquor which would otherwise be used in dyeing the flesh side as deep as the grain. In staining leather, however, only one side, the grain side, is subjected to the action of the dye liquor. The *modus operandi* in staining leather is to lay the skin on a table (which has a marble or else hardwood top), neck part to the left hand; the table should be soaped and the skin smoothed out so as to prevent it slipping. Then a brushful (or spongeful) of the staining fluid is applied, going first straight down the middle of the back, then a second brushful applied rapidly round the sides, and finally a third brushful laid across from side to side, paying particular attention to distribute the dye liquor as evenly and rapidly as possible, then put the skin over the horse or trestle, and proceed with a second skin in the same way. When about a dozen skins have been thus treated, the skin first stained should be laid on the table, and given a second application of the staining fluid in just the same way, and so on through the dozen skins; if a third application of the dye is required, the operation is repeated *de novo*. If the skin requires mordanting before staining, it is best to have two operators at work, one to lay on the mordanting fluid and pass the skin to the dyer. The striker or topping agent should not be given until all the necessary coatings of stains are applied. Stained leather does not require to be rinsed with water, as it is the object of the stain to penetrate the fibre of the leather, so as to give a well-nourished look; if not well filled with the dye liquor a hungry appearance is given to the stained side. In staining leather it should be the endeavour of the dyer to keep the flesh side of the skin as clean and free from stains as possible; a stained skin clean on the flesh side is always a more marketable article than one splashed with stain or otherwise disfigured by discoloration. To ensure cleanliness it is best to wipe

the top of the table after applying the stain to a skin before laying a second skin on the table.

After the above explanation of the *modus operandi*, the following recipes and formulæ require no further explanation as to use. It should be mentioned, however, that the dye liquors, staining products, etc., should always be prepared in glazed earthenware or enamelled iron pans, as wooden ones are not suited because the dye liquor would penetrate the wood, and so render such vessel useless for holding a different dye liquor. The materials used in dyeing and staining leathers are:—

Acids for scouring the skins to enable them to take certain colours (*e.g.*, some aniline blues can be used only on an acid base, others on an alkaline one). The acids in use are the mineral ones, sulphuric, nitric, hydrochloric, and the vegetable acids, acetic, oxalic, and tartaric or citric.

Bases such as potassic and sodic hydrates, ammonia and lime. Many aniline colours require an alkaline base, and the mild alkalinity of soap forms a good base for use with such colours.

Salts of metals (which are new bodies formed by the use of an acid with a base), such as sulphates of iron, copper, aluminium, zinc and common alum, nitrates of iron and lead, chlorides of tin, sodium and ammonium (sal ammoniac), acetates of iron, lead, copper and aluminium, tartrate and carbonate of potash, bichromate of potash, ferrocyanide and ferricyanide of potash. Most of the above salts are used as mordanting liquids when dissolved in water, either alone or in combination; sometimes they are used as strikers or topping agents, that is, solutions of these salts are applied to the dyed leather so as to subdue or tone down its fierceness, or strike the particular tone of colour desired.

The soaps used in dyeing are soft and hard soap (*i.e.*, potash and soda soaps), which have been made by the aid of tallow

or palm oil; a mordanting with soap will enable the dye liquor to strike an even coloration and give a nourished look to the skin, while in some cases an application of soap liquor to the dyed skin will impart lustre and give a good finish.

Process of Dyeing Glove Leather.—This kind of leather is dyed either on the flesh or grain side. The latter process is executed either by dipping or painting. In order to obtain uniform colouring the skins must in all cases be cleansed, i.e., uniformly moistened by fulling in a drum or treating in lukewarm water. For this purpose the skins are placed in a vat with sufficient warm water to allow of their being thoroughly washed and trodden with the bare feet by a workman until they show no white spots, as by this treatment they lose a part of the egg substance and flour previously imparted with the tawing paste (*vide supra*). It is restored either only with yolk of egg (1 yolk for each skin), or with an addition of flour (100 yolks of eggs and 2½ lb. of flour for one gross of skins). If several lots of skins are to be cleansed in succession, a saving of egg yolk is effected by adding warm water to the liquor remaining from the first lot, and using it, for treating the second lot, and so on.

The method of dyeing the skin on the flesh side is the following: Brush the flesh side with whiting, and then smooth the skin with the hone. Afterwards clean the skin, wring it out and dry, and then work it over the stretcher. To perform the dyeing operation spread the skin on the dye table (a zinc one with a rim a couple of inches high or so), then lay on the dye liquor, using a long-haired bristle brush. Directly after the dye is applied, and while the skin is still moist, stretch it on a frame and pumice it. In executing this operation the workman holds the lower end of the skin with his left hand and rubs with the right from top to bottom, pressing the pumice stone as hard as possible upon

the skin. After turning the skin and pumicing the portions not touched in the first operation the skin is dried, in damp weather in a heated room. After drying and working with the stretcher it receives a second application of colour, and is again dried and worked with the stretcher. If the colour is not sufficiently intense, a third application is given. As the skins contain alum in them, they do not require any mordant, therefore simple decoctions of dyewoods, barks and berries, such as logwood, Brazil wood, Persian berries, quercitron, etc., are compounded for the different shades.

A black colour is imparted to the skins by giving them a coat of iron liquor (*vide supra*), acetate or pyrolignite of iron, of about 2° Bé., and after drying, give a strong application of logwood decoction, and finally one of acetate of iron. Pumicing is not required. To oxidise the iron the skins are exposed to the air for a few days, and then brushed with a brush moistened with pure olive oil or almond oil, in order to give the black colour the desired lustre. To avoid spots, moisten the palm of the hand with the oil, and after passing it over the brush, take the oil from this brush with a second, and rub the oil into the skin with the leather. To prepare by the above method of dressing, alumed leather, or imitation Swedish leather, apply, after cleaning the skins, a colour of oak bark, decoction of fungi and Brazil wood, and after giving yolk of egg, stretch, dry, and work them with the stretcher, then apply the second coat of colour, stretch and work them with the stretcher, and finally brush the leather upon the flesh side. To dye the skin upon the grain side, in glazed leather and glazed glove leather, the skins are first sorted into different classes, the finest and whitest being reserved for white gloves, while the others are selected for light or dark colours according to the clearness of the grain. The skins are then prepared in the same manner as those to be dyed upon the flesh side.

Dyeing by Dipping.

Method of Preparation.—To dye glaze skins by dipping, pour, after cleaning and taking the skin from the vat, one-third of the dye into the bath, the temperature of which should not exceed 77° to 86° F., into a vat, and work the skins in it with the hands to make the absorption of colour uniform. Then beat them with the feet until the colour of the bath is exhausted; after ten minutes remove the skins from the vat, and after pouring in the second third of the dye, proceed in the same manner as before, and after that with the last portion of the dye. Including cleaning, dyeing is accomplished in less than an hour. The remaining dye liquor is poured into a vessel and used for another colour. The dyed skins, after treating with yolk of egg, wringing out, swinging in the air, and stretching, are suspended by the lowest ends of the hind shanks, and quickly dried. As the flesh side is also dyed by dipping, this process is generally only used for delicate and light colours. Berries are still often used as dye stuff. For yellow, Persian berries, for grey, dwarf elderberries, for sea-green, privet dogwood berries, and for other green shades, buckthorne berries. Very dilute decoctions of dyewoods are also used: For canary yellow, weld; for rose colour, Brazil wood; for lilac, logwood; and for other shades mixtures of these decoctions. A pearl colour is for instance prepared by boiling 18 oz. of Persian berries, 2½ oz. ground Brazil wood, and 18 oz. of dwarf elderberries in 21 pints of water for two hours. It is not advisable to use astringent substances such as quercitron, sunach, oak tan, etc.

Dyeing by Painting is effected in a manner similar to the process adopted in applying stains. Three or four coats of colour are applied in quick succession, and the skins allowed to dry upon the boards. When dry they are taken from the stretching boards, put in a damp place, and worked with the stretcher.

Staining Fluids : Yellow, Orange, Brown and Saffron Stains."

For saffron stains boil saffron in water until the colour is extracted, and separately digest annotta in methylated spirits, and then after straining both fluids, mix them in varying proportions according to the tone of colour required. The depth of colour depends on the quantity of annotta used.

An aqueous decoction of saffron should be mixed with methylated spirits in order to set the colour.

An annotta stain is obtained by digesting 11 oz. of annotta in 80 fluid oz. of urine; allow to stand for twenty-four hours, and then add 120 fluid oz. of water, and boil until reduced to half the original quantity.

A Brown Stain is obtained by adding :—

- 1 pint water, boiling hot.
- 1 oz. oxalic acid.
- 1 oz. hydrochloric acid.
- 1 oz. bruised cochineal.

Saffron Yellow Stain.

Ingredients.—5 oz. saffron.

1 pint methylated spirit (80 per cent.).

Method of Preparation.—Digest at moderate heat for several days, and further dilute with water or spirit, q. s.

Ordinary Yellow Stain.

Ingredients.—17½ oz. fustic (ground) (or else 17½ oz. birch leaves).

2½ lb. vinegar.

1 oz. carbonate of potash.

1 oz. alum, free from iron.

2½ lb. water.

Method of Preparation.—Put the fustic (or birch leaves) for one hour in the vinegar, separately dissolve the alum and potassium carbonate in the water, then mordant the leather with this fluid, and when dry apply the staining fluid.

Bright Yellow Stain.

Ingredients.—1 oz. turmeric (ground).

½ oz. gamboge.

26½ oz. methylated spirit (80 per cent. strength).

Method of Preparation.—Digest at gentle heat and filter, and for a mordant use the solution of potassium carbonate and alum as given in last recipe.

A *Yellow Stain* from barberries is obtained by boiling 17½ oz. of barberries in 2½ lb. of water, and filtering the decoction. Use the mordant given in last recipe.

Yellow Stain from Weld (Dyers' Weed).

Ingredients.—17½ oz. weld (from *reseda luteola*).

3½ lb. of water.

Method of Preparation.—Prepare as in last recipe.

Fustic boiled in alum water gives a yellow stain. It is darkened by the addition of a little powdered Brazil wood boiled with the wood. This is useful for rein, strap and belt leathers.

Brown Stain.

Ingredients.—17½ oz. nutshells (dried and powdered).

52½ oz. milk of lime.

Method of Preparation.—Boil the nutshell powder in the milk of lime for an hour, and then strain through a cloth.

A *Deeper Brown Stain* is obtained by boiling :—

4½ oz. ground logwood,

4½ oz. annotta,

17½ oz. water;

and then adding a solution composed of—

• ½ oz. carbonate of potash.

2½ oz. vinegar.

Pine and Alder Bark in equal parts boiled in six times their weight of water, until all colouring matter is extracted, yields a brown staining fluid; it should have a little alcohol mixed with it to cause it to "set" on the leather.

Umber and Lamp-black when ground up with ox galls in the following proportions give a brown coloration to leather:—

Ingredients.— $4\frac{1}{2}$ oz. umber.

$\frac{1}{2}$ oz. lamp-black.

$17\frac{1}{2}$ oz. ox galls.

Picric Acid dissolved in water in the proportion of 1 pint acid to 10 oz. water, heated to blood heat, yields a good yellow stain.

The above stains are for tanned leathers, such as bag, belt, strap, harness and portmanteau leathers. The following recipes are for—

Yellow and Brown Stains in Kid Leathers.—These kind of leathers have been tawed by the aid of alum, and therefore they do not so readily yield to the coloration of the ordinary dye liquors. The following recipes, however, are the most applicable for this kind of leather:—

Lemon Yellow.

Method of Preparation.—Digest 1 part of turmeric in 4 parts of alcohol at a moderate heat, and dilute with ordinary whisky, and lay the dye on with a sponge; after drying the skins on the board rub them with a woollen rag dipped in Spanish chalk. No mordant is required with the above stain.

Orange Stain.

Method of Preparation.—Digest 1 part of Brazil wood shavings in 8 parts of methylated spirit, and dilute with water; give a mordant of fustic liquor and logwood (no iron) as directed below. A decoction of annotta and madder also gives an orange stain.

Pale Yellow or Light Buff.

Method of Preparation.—Digest 1 part of madder in 4 parts of methylated spirit; use the ordinary mordant without sulphate of iron.

Deep Buff Yellow.

Ingredients.—21 pints of water.

1 oz. potash.

1½ oz. soap.

9 oz. annotta.

Method of Preparation.—Boil all together.

Straw Yellow.

Method of Preparation.—Mordant with a bath of soda, 4° Bé., and then with one of nitrate of iron of the same strength, allowing the soda solution to dry in before applying the iron; afterwards sponge off with water, and dry at a gentle heat, then finish with the following

Finish for Glove Leathers.

Ingredients.—25 oz. water.

155 grains yolk of eggs.

77 grains glycerine.

Buff Yellow on leather is obtained by brushing the leather over with a solution of soda of 4° Bé, drying the leather, and then brushing it over with a solution of nitrate of iron of the same strength, repeating both fluids if necessary. Finish off with yolk of egg. This is a suitable colour for bags, portmanteau leathers, etc.

Brown.—Use a decoction of logwood and sumach wood, and for dark tones give a topping with sulphate of iron solution.

Brown.

Ingredients.—35 fluid oz. water.

45 grains extract of logwood.

30 grains orchil.

Method of Preparation.—Dissolve the extract in the water by boiling, and then add the orchil, and apply this solution at 110° F. Afterwards brush the leather with a solution of

3 oz. sulphate of iron.

35 fluid oz. water.

After applying the solution, sponge off with water. For a reddish tint dissolve 30 grains of alum along with the sulphate of iron. When dry rub the leather with a woollen rag and rye meal. If nitrate of iron be used instead of the sulphate, a grey tone is produced. The stain should be used at 104° F., and the glove leather sponged over with a solution of soap before staining.

Light Brown.

Ingredients.—12 gallons fustic dye liquor.
1½ gallons Brazil wood dye liquor.
3 quarts logwood dye liquor.

Olive Brown.

Ingredients.—6 gallons fustic liquor.
6 gallons logwood dye liquor.
½ gallon Brazil wood dye liquor.

Mixed Brown.

Ingredients.—4 gallons fustic liquor.
6 gallons Brazil wood dye liquor.
4 gallons logwood dye liquor.

Dark Brown.

Boil 8 parts (by weight) of fustic,
1 part logwood,
2 parts Brazil wood,
1 part sandal-wood,
½ part quercitron,

in sufficient water to cover the ingredients 2 inches deep, boil for one hour, strain the liquor, and when cold use after dyeing with a fluid solution of sulphate of iron.

Light Brown.—Use the ingredients mentioned in last recipe. Do not use the striker, but give a mordant of potash solution before applying the dye liquor.

Olive Brown.

Boil as above—

Ingredients.—2 parts fustic.
1 part quercitron.
 $\frac{1}{2}$ part logwood.

Method of Preparation.—Mordant with a strong solution of potash, and use as a striker sulphate of iron solution.

Catechu Brown.—Make a decoction of
18 oz. catechu.
10 $\frac{1}{2}$ gallons water.
2 oz. sulphate of iron.

Use as a mordant bichromate of potash solution.

Coffee Brown.

Method of Preparation.—First mordant the skin with a solution of

36 oz. acetate of copper.
13 $\frac{1}{2}$ gallons water.

After drawing the skins wet them immediately with a solution of yellow prussiate in slightly acidulated water. A second formula for a coffee brown is this:—

Boil 2 lb. ground oak bark.
1 lb. fustic and some lye in water.
Then boil 1 $\frac{1}{2}$ oz. of Brazil wood.
1 oz. logwood in water.

Add gradually of this to the first solution until the fluid has assumed a brown colour, and then add more or less sulphate of iron dissolved in warm water, according as the tint is more or less dark.

Camel Brown.

Boil 2 lb. oak bark,
2 oz. sumach,
1 oz. Brazil wood,
onion peel in water,

and use the decoction warm after straining it.

Chestnut Brown.

- Boil 1 lb. ground logwood.
 2 lb. ground Brazil wood.
 1 lb. ground fustic.
 4 oz. gall nuts in water.

*Various Tones of Brown.***Dark—**

- (a) Mix 8 lb. decoction of fustic.
 2 lb. infusion of huckleberries.
 4 oz. decoction of logwood.
 indigo carmine.
- (b) Mix 17½ lb. decoction of fustic.
 4½ lb. decoction of fustic.
 13½ lb. decoction of Brazil wood.
 4½ lb. decoction of logwood.
- (c) Mix 8½ lb. decoction of birch bark.
 4½ lb. decoction of willow bark.
 4½ oz. infusion of elderberries.
 8 grains indigo carmine.

Light—

- (d) Mix 13 lb. decoction of fustic.
 13 lb. decoction of fustic.
 2 lb. decoction of Brazil wood.
 1 lb. decoction of logwood.
- (e) Mix 8½ lb. decoction of willow bark.
 4½ lb. decoction of fustic.
 2 lb. decoction of fustic.
 ½ oz. decoction of logwood.
- (f) Mix 17½ lb. decoction of fustic.
 8½ lb. decoction of Brazil wood.
 4½ lb. decoction of logwood.

(g) Orange Brown.

Method of Preparation.—Boil 8 oz. ground fustic and ½ oz. ground Brazil wood in 60 fluid oz. water.

Olive Brown.

- (h) Mix 10 lb. decoction of fustet.
 6 lb. decoction of fustic.
 2 lb. decoction of Brazil wood.
 4 lb. decoction of logwood.

Red Stains for Leather.

Method of Preparation.—Boil cochineal crushed in a linen bag in water that has had mixed with it 2 per cent. of liquor ammonia. This solution gives a splendid red colour on tanned leather. Red of various shades for tanned leathers is obtained by using spirituous extract of sandalwood in a weak mordant of potash solution.

Scarlet is obtained by giving an extract of carthamine on skins that have been mordanted with a weak solution of annotta; the extract of carthamine should be dissolved in a solution of 1 pint of tartaric acid in 60 of water.

A *Pale Flesh Red* is produced by rubbing the skin in a solution of alizarine or extract of madder in weak soda lye and rinsing in water.

Orange Red.

- Mix 4 lb. decoction of willow bark.
 4 lb. decoction of fustet.

For a Common Red.

- Boil 1 lb. logwood.
 8 oz. Brazil wood.
 2 oz. onion peel.
 some common salt.
 alum in 4 gallons water.

Garnet Red.

Method of Preparation.—Boil $\frac{1}{2}$ lb. Brazil wood and some turmeric in water together.

Rose Colour.

Boil for 1 hour—

15 grains cochineal, cut up in
 16 oz. water, and add
 2 oz. decoction of logwood.
 6 drops of hydrochloric acid.

Flesh Colour.

Method of Preparation.—Boil 4 oz. bruised Persian berries and 25 grains potash in water, and add gradually a decoction of Brazil wood until the desired tint is obtained.

Cochineal Stain for Tawed Leathers.

Digest 1 oz. cochineal in
 17½ oz. alcohol (80 per cent.),
 until it is dissolved, and then filter and dilute with a mixture
 of spirits and water, q. s.

Scarlet Stain for Tanned Leathers.

Dissolve 1 oz. cochineal in
 4½ oz. alcohol (80 per cent.),
 and filter for use.

Bright Red Stain for Tawed Leathers.

Pour 2½ lb. of vinegar over
 8½ oz. red Brazil wood,
 and digest for 8 days, with frequent stirring; then filter
 through a cloth. Separately prepare a solution of
 1 oz. alum in
 8½ oz. water,
 and mix the two solutions; a little bitartrate of potash may
 be added to the Brazil wood decoction while boiling it.

Purple Stain for Tawed Leathers.

Boil together for 1 hour—

2½ lb. rasped logwood.
 5½ lb. rasped Lima red dyewood.
 5½ lb. water.

Filter and apply to the leather until the red tone desired is
 obtained; afterwards give a firing or application of this
 topping agent:—

$\frac{1}{8}$ oz. carbonate of potash.
17 $\frac{1}{2}$ oz. water.

If too much of the colour be used a blue instead of a red colour is obtained.

Russian Red is obtained by a decoction of cochineal mixed with tin salt and some oxalic acid, and for dark shades a little logwood extract added

Purple on Tawed Leathers.

Method of Preparation.—Put into a copper boiler:—

8 $\frac{1}{2}$ oz. Brazil wood shavings.
1 oz. cochineal.
2 $\frac{1}{2}$ lb. water.

Filter the decoction, and then mix with a sufficient quantity of fluid chloride of zinc to obtain either a dark or light colour.

Crimson Stain for Tawed Leathers.

Mix together—

1 part (by weight) of cochineal solution.
1 part cream of tartar.
3 parts chloride of zinc.

Shake up well and submit to a gentle heat for twenty-four hours, and then add liquor ammonia drop by drop until the desired colour is obtained.

Violet Stain on Tawed Leathers.

Method of Preparation.—Boil 17 $\frac{1}{2}$ oz. Brazil wood for 1 hour in $\frac{1}{2}$ lb. water, and filter the decoction; separately make a solution of 4 $\frac{1}{2}$ oz. sulphate of iron in 8 $\frac{1}{2}$ oz. water, and mix the two fluids for use.

Green Stain on Tanned Leathers.

No. 1. Boil 10 lb. ground fustet,
2 lb. logwood,
2 lb. fustic,
Water, q. s.,

and add to the infusion

8 oz. decoction of gall nuts,
and dissolve 3 oz. of sulphate of copper in the mixture.

No. 2. Boil 1 lb. ground logwood,
1 oz. onion peel, cut up,
1 oz. fustic,
2 oz. alum,
water, q. s., for 2 hours.

Olive Green.

Method of Preparation.—Boil fustic and some bruised gall nuts in water, and add solution of sulphate of iron until the desired tint is obtained.

French Green.

Dissolve 1 oz. of alum in
1 gallon of water,
and use as a mordant this for the following green dye liquors:—

Digest 1 lb. of indigo carmine in
3½ gallons boiling water,
and add 10 lb. strong decoction of fustic,
2 lb. decoction of logwood.

Grey Green.

Mix 13 lb. decoction of willow bark.
4 lb. decoction of fustic.
½ lb. decoction of logwood.

Light Green.

Mix 17½ lb. decoction of fustic with
2 lb. decoction of logwood.

Dark Green.

Mix 25 lb. decoction of fustic with
25 lb. decoction of logwood.

A Green Stain for Tanned Leathers.

Dissolve ½ oz. indigo carmine in
2 oz. soft water.

separately dissolve—

$\frac{1}{2}$ oz. picric acid in
2 oz. boiling hot water.

Mix both solutions.

Another Green Stain for Tanned Leathers is obtained by dissolving:—

$1\frac{1}{3}$ oz. verdigris and
 $\frac{1}{2}$ oz. sal ammonia in
 $8\frac{1}{2}$ oz. pure vinegar.

A yellowish green is obtained by adding a little saffron extract to the above fluid.

Blue Stains for Tanned Leathers.

Azure Blue.

Method of Preparation.—Dissolve 2 oz. of prussiate of potash in $1\frac{1}{2}$ gallons of tepid water, brush the solution over the skin until it penetrates it, and then give a light coat of a weak solution of nitrate of iron.

Violet.

Mix 8 oz. decoction of logwood.
2 oz. decoction of Brazil wood.
 $1\frac{1}{2}$ oz. decoction of alum.

Lilac.

Boil for 2 hours—

12 oz. logwood,
a little rum, and
some alum in water, q. s.

Add 2 or 3 oz. decoction of Brazil wood.

Violet Blue.

Mix 1 lb. decoction of logwood, and
 $\frac{1}{2}$ lb. decoction of Brazil wood,

and apply after mordanting with the usual mordant for tanned leathers.

Silvery Grey.

Method of Preparation.—Mix a decoction of weld with some infusion of bilberries.

Grey Glove Colours.

Mix $17\frac{1}{2}$ lb. decoction of willow bark.

2 lb. decoction of logwood.

A pearl grey is obtained by using only $\frac{1}{4}$ of the above quantity of logwood decoction.

A *Light Blue on Leather* is obtained by moistening the leather with alum dissolved in urine, and using as a dye the strained juice of corn-flowers.

Another blue on tanned leather is obtained by rubbing up Berlin blue in sour milk, and after several hours adding some dilute sulphuric acid and sugar water; give several applications.

Violet Stain for Tanned Leathers.

Method of Preparation.—Digest 1 part of logwood chips in 8 parts of methylated spirits, and after diluting with water apply to the skin after having mordanted it with a solution of sulphate of iron.

Dark Blue.

Method of Preparation.—Use a concentrated decoction of logwood upon a strong ground, without application of green vitriol. A better and faster blue is obtained by applying a solution of indigo carmine.

Dark Green on Tanned Leathers.

Method of Preparation.—Apply a decoction of 4 parts quercitron and 1 part logwood upon a strong grounding of green vitriol solution. Some dogwood berries may be added to the decoction, and for firing a like quantity of blue vitriol to the green vitriol.

Olive Green.

Method of Preparation.—Apply upon a strong grounding of potash a decoction of

2 parts quercitron.
1 part fustic.
some dogwood berries.

Omit the green vitriol.

Light Olive Green.

Method of Preparation.—Give the skin a light ground with Berlin blue, and apply upon this a liquor obtained by boiling 2½ lb. of fustic and 10½ oz. archil in 5¼ gallons of water.

Picric Green.

Method of Preparation.—Apply a solution of picric acid in water to the skins previously grounded with Berlin blue.

Medium Green on Tanned Leathers.

Method of Preparation.—Extract ½ oz. gall nuts in 35 fluid oz. of water, and brush this over the leather three times; separately dissolve 155 grains extract of indigo and 155 grains of alum in 35 fluid oz. of water, and brush over in the cold; then dry the leather. Lastly dissolve 155 grains of extract of fustic in 35 fluid oz. water, and apply this fluid twice; then give one application of 77 grains glue dissolved in 35 fluid oz. water, and dry the leather; afterwards finish off with egg yolk.

Black Stains for Tanned Leathers.

Method of Preparation.—Dissolve 1¼ oz. solid extract of logwood, and ¾ oz. fustic extract in boiling water, and make up to 35 fluid oz.; lay this over the stretched leather five times at 100° F.; then dissolve 155 grains of chromate of potash and 77 grains of sulphate of copper in 35 fluid oz. of water, and give two applications of this fluid to the leather, and then apply the logwood decoction again. Next pour 150 grains of liquid ammonia into 35 oz. of water, and apply that to the leather. As a finish to the leather stir up 150 grains of yolk of egg in 75 grains of glycerine, and make up with water to 35 fluid oz., and rub this over the leather. Let it get dry, and then rub with a clean woollen rag.

Black on Sumach Tanned Leathers.

Method of Preparation.—Give a solution of sulphate of iron or acetate of iron, and afterwards top with a solution of logwood extract.

Black on Oak Tanned Leathers.

Boil $4\frac{1}{8}$ oz. bruised nut galls and
 $17\frac{1}{2}$ oz. green nut shells in
 $26\frac{1}{2}$ oz. water

for one hour, then strain, and apply this to the leather, having first mordanted it with the solution of iron filings, common salt and vinegar, as already given.

Black Stain for Tanned Leathers.

Boil 1 part of logwood in
 $\frac{1}{2}$ part quercitron for two hours.

Give an application of this to the leather, having first mordanted it with the mordanting liquid given below; and for the dye liquor—

Boil $2\frac{1}{2}$ lb. logwood.
 21 lb. fustic.
 $\frac{1}{2}$ lb. yellow berries.
 $\frac{1}{2}$ lb. gall nuts (powdered).
 1 lb. sumach.
 8 gallons water.

Boil for two hours, or until reduced one-half in bulk; after applying this, top with green vitriol solution.

Iron Grey for Tanned Leathers.

Mix 9 oz. of tan liquor.
 $2\frac{1}{2}$ lb. solution of green vitriol.
 $\frac{1}{2}$ to $\frac{1}{4}$ oz. logwood extract.

Apply upon a strong ground, omitting the application of green vitriol.

Dark Grey for Tanned Leathers.

Method of Preparation.—Apply upon a strong grōunding, and give a coat of green vitriol.

Ingredients.—18 oz. decoction of fustic.

9 oz. tan liquor.

$\frac{1}{2}$ to $\frac{1}{4}$ oz. logwood extract.

The following liquids are used either alone or combined as mordanting fluids before applying the dye liquor to tanned leather.

Brazil Wood Mother Dye Liquor.

Boil 5 lb. extract Brazil wood in

10 gallons water

for ten minutes, then add, with constant stirring—

1 oz. potash,

1 oz. soda,

and continue boiling for another five minutes.

For the fustic mother dye liquor prepare a decoction of fustic extract in the same way. For the logwood mother dye liquor use only $4\frac{1}{2}$ lb. extract of logwood for 20 gallons of water, and then add 1 gallon old urine; boil ten minutes.

Add 1 oz. soda, and

2 oz. potash, and

boil for five minutes longer. The strikers to use with the mother dye liquor are made of sulphates of copper, iron and aluminium.

Striker No. 1 consists of 3 lb. alum dissolved in 40 gallons of water.

Striker No. 2.—3 lb. sulphate of copper in 40 gallons of water.

Striker No. 3.—1 lb. sulphate of iron in 40 gallons of water. By the use of the above dye liquor and strikers the several shades of brown on tanned leather suited for straps, reins, bags, etc., can be produced by mixing this in varying proportions. Apply the dye with a short-haired brush, having stretched the skin smooth and even on the table by the aid of a slicker. First brush the skin with two brushfuls of

old urine, using a separate brush for this liquid, then apply the mother dye liquor at once, giving three or four applications, and brushing the skin on all its parts for about 1½ minutes with each brushful of dye liquor. When the skin is well permeated with dye liquor, lay on striker No. 1, two brushfuls being sufficient for each skin, slick with water afterwards, and beat out all water with a copper slicker, and then hang up the skin.

The above stains are such as are made by means of the dyewoods and mineral salts. The following formulæ give mixtures for colouring leathers.

Aniline Dyes.—The process of using aniline dye liquors has been already explained (*vide supra*). The process is accomplished either by dipping, or else by steeping the skin in the dye liquor, therefore the following recipes do not require any detailed instruction concerning the necessary manipulative processes in the dyeing operation. Of course these aniline dye liquids can be used by painting (*i.e.*, laid on with brush or sponge), but in such cases the dyer must pay particular attention to the evenness of coloration by using several dye baths of weak strength, instead of one of full strength.

It should be mentioned that leathers which are to be coloured with fancy colours are usually tanned in sumach, but oak and union tanned leathers, such as calf, can be dyed some of the darker tones of fancy colours by the use of suitable mordants, strikers, and particular manipulative processes.

Dyeing Leather Red.

Rose Red.

Ingredients (No. 1).—100 parts of water.

1 part eosine A.

10 parts Glauber's salt (sulphate of soda).

3 parts acetic acid.

Method of Use.—Wash the skin in the bath until the desired tint is obtained. The addition of sulphate of soda is made on purpose to ensure evenness of coloration—such body is known as “leveller” or levelling agent. Sometimes phosphate of soda is used instead of Glauber’s salt.

Rose Pink.

Ingredients (No. 2).—100 parts water.

1 part azo eosine,¹

10 parts Glauber’s salt.

2 parts water.

No. 3.—*Claret Red.*

Method of Preparation.—Make a dye bath of magenta, and shade off with a little chrysoidine.

Scarlet.

Ingredients (No. 4).—100 parts water.

1½ parts No. 2 magenta B.

1 part auramine.

10 parts Glauber’s salt.

Scarlet.

Ingredients (No. 5).—100 parts water.

2 parts azo cochineal.

10 parts Glauber’s salt.

2 parts sulphuric acid.

Crimson.

Ingredients (No. 6).—100 parts water.

1 part No. 2 magenta B.

10 parts Glauber’s salt.

Fast Crimson.

Ingredients (No. 7).—1½ oz. azo bordeaux (fast crimson).

40 oz. water.

¹ When using an acid dye colour the best process to follow is to make the dye bath without the acid, then work the skins in it until they are well filled with the dye liquor, then add the acid, and proceed with the dyeing until the right tone is obtained.

Method of Use.—Dissolve the dye in the water, and having raised 20 gallons of water to 110° F., put in half the dye liquor, then put in the skins, work them about from five to fifteen minutes, then lift them out, put in balance of dye liquor and re-enter skins, and work to tone of colour desired; then lift them out, rinse in clean water, stretch on frame and dry. The skins before being put into the dye liquor should be mordanted by dipping in 10 gallons of water in which 1 oz. of borax has been dissolved. The above proportions are for one dozen skins.

Rose Bengale.

Ingredients (No. 8).—2½ oz. rose Bengale.

40 oz. water, boiling hot.

Method of Use.—Mordanting fluid, 6 oz. alum in 10 gallons water. Work in precisely the same way as directed in No. 7.

Dyeing Leather Orange and Yellow.

Light Lemon Yellow.

Ingredients (No. 9).—100 parts water.

1 part thioflavine T.

10 parts Glauber's salt.

Dark Yellow.

Ingredients (No. 10).—100 parts water.

1 part auramine.

10 parts Glauber's salt.

Bright Yellow.

Ingredients (No. 11).—100 parts water.

1 part naphthol yellow.

10 parts Glauber's salt.

2 parts sulphuric acid.

Orange Yellow.

Ingredients (No. 12).—100 parts water.

1 part croosin orange.

10 parts Glauber's salt.

2 parts sulphuric acid.

Orange.

Ingredients (No. 13).—40 fluid oz. water.

3 oz. orange B R.

Method of Use.—Mordant with 2 oz. tannic acid in 10 gallons water. Prepare and use as directed in No. 7.

Brown Dyes.

Walnut Brown.

Ingredients (No. 14).—100 parts water.

1 part Bismarck brown R.

‡ part nigrosine.

10 parts Glauber's salt.

Bismarck Brown.

Ingredients (No. 15).—100 parts water.

1 part Bismarck brown R.

10 parts Glauber's salt.

Nut Brown.

Ingredients (No. 16).—100 parts water.

3 parts benzo brown.

10 parts common salt.

Leather Brown.

Ingredients (No. 17).—10 gallons water.

5 oz. extract fustic.

‡ oz. azo red A.

1 oz. logwood.

Method of Use.—Make up into a bath at 110° F.; use as a mordant 3 oz. white tartar and 4 oz. alum in 10 gallons water. Use as directed in No. 7.

No. 18.—*Ordinary Brown.*

Method of Use.—Mordant the leather with a fluid compound of 75 grains tannic acid per 35 fluid oz. water, then give an application of the following dye liquor:—

75 grains Bismarck brown,
45 grains white glue, } heated to 100° F.
35 oz. water.

If darker tone be required give an application of
15 to 45 grains sulphate of iron per
35 oz. water.

Allow the skin to dry and then finish with egg yolk.

Green Dyes—

Bronze Green.

Ingredients (No. 19).—100 parts water.
1 part brilliant green.
 $\frac{1}{2}$ part Bismarck brown.
10 parts Glauber's salt.

Olive Green.

Ingredients (No. 20).—100 parts water.
1 part brilliant green.
 $\frac{1}{2}$ part chrysoidine.
10 parts Glauber's salt.

Bright Green.

Ingredients (No. 21).—100 parts water.
1 part green crystals Y.
10 parts Glauber's salt.

Peacock Green.

Ingredients (No. 22).—100 parts water.
1 part malachite green.
 $\frac{1}{2}$ part Nile blue A.
10 parts Glauber's salt.

Blue Dyes—

Bright Blue of Violet Tone.

Ingredients (No. 23).—100 parts water.
1 part Victoria blue 4 R.
10 parts Glauber's salt.

No. 24.—*Dark Blue.*

Method of Preparation.—Dye a grey by using
and then a blue with Victoria blue 4 R as in last recipe.

Light Blue of Greenish Tone.

Ingredients (No. 25).—100 parts water.

1 part Nile blue A.

10 parts Glauber's salt.

No. 26.—*Bright Blue.*

Dissolve $1\frac{1}{2}$ oz. soluble blue R, in

40 oz. water.

Use as a mordant

$1\frac{1}{2}$ oz. borax in 10 gallons water.

Prepare and use as directed in No. 7.

The aniline dyes do not impart a good deep black on skins ; they produce either a grey or blue tone, but a very good

General Formula for Black Dye is this :—

Ingredients (No. 27).—100 parts water.

15 parts logwood extract.

10 parts sumach extract.

2 parts verdigris.

5 parts iron liquor.

Method of Preparation.—Heat to 100° F., and work the skin therein until deeply coloured.

Process of Dyeing Sheep Skins for Mats, Rugs, etc.

Many of the recipes given above for aniline dyes can be used for dyeing wool or sheep skins for carriage mats, rugs, etc., while the following few special ones supplement some. The *modus operandi* is that given below.

Deep Red.

Ingredients (No. 28).—100 parts water.

2 parts amaranth.

10 parts Glauber's salt.

2 parts sulphuric acid.

Scarlet.

Ingredients (No. 29).—100 parts water.

3 parts Titan scarlet S.

20 parts chloride of sodium.

2 parts sulphuric acid.

*Maroon.**Ingredients* (No. 30).—100 parts water.

- 1½ parts azo yellow.
- 2½ parts fast acid violet R.
- ½ part acid violet 5 B F.
- 10 parts Glauber's salt.
- 2 parts sulphuric acid.

*Yellow.**Ingredients* (No. 31).—100 parts water.

- 3 parts Titan yellow.
- 20 parts salt.
- ½ oz. acetic acid.

*Green with a Blue Tone.**Ingredients* (No. 32).—100 parts water.

- 1 part green crystals Y.
- 10 parts Glauber's salt.

*Bright Olive Green.**Ingredients* (No. 33).—100 parts water.

- 2 parts patent blue V.
- ½ part fast acid violet R.
- 1½ parts azo yellow.
- 10 parts Glauber's salt.
- 2 parts sulphuric acid.

*Dark Blue.**Ingredients* (No. 34).—100 parts water.

- 2½ parts patent blue V.
- ½ part fast acid violet R.
- ½ part azo yellow.
- 1 part acid violet 5 B F.
- 10 parts Glauber's salt.
- 2 parts sulphuric acid.

*Peacock Blue.**Ingredients* (No. 35).—100 parts water.

- 1½ parts indigo extract.
- ½ part Glauber's salt.
- 3 parts sulphuric acid.
- ½ part picric acid.

Dark Brown.

Ingredients (No. 36).—100 parts water.
 1½ parts Titan brown Y.
 ¾ parts Titan blue 3 B.
 10 parts salt.
 ½ part acetic acid.

Grey.

Ingredients (No. 37).—100 parts water.
 ½ part acid blue 4 S.
 ½ part Titan red.
 5 parts acetate of ammonia.

Black.

Ingredients (No. 38).—100 parts water.
 16 parts Glauber's salt.
 4 parts sulphuric acid.
 6 parts naphthol black, B.
 ½ part naphthol yellow, S.
 ¾ part naphthol green, B.

Dyeing skins.—The following is the *modus operandi* for dyeing the wool on the skin for mats, rugs, etc. The skin is fastened to a framework of wood by means of hooks or pegs projecting from the edges of the frame. This frame is capable of being stretched in both directions, length and breadth, by a suitable arrangement of screws in the centre of the frame on the reverse side to that on which the skin is fixed. The flesh side of the skin is next to the frame, so as to permit the wool to be exposed. This frame fits on ledges fixed round the sides of rectangular copper pans, and the stretching frame is attached to a pulley so that it can be raised vertically out of the pan when desired. By this arrangement the depth of wool that is in contact with the dye liquor can be regulated at will. In an American apparatus for dyeing skins with the wool or hair on, the skin to be dyed is first sewed to a cloth and then hooked on to the

points or pegs of the stretching frame above, and fastened to the frame is a box-like structure which permits air to be passed into it. When all is ready for dyeing, the air is forced into the air chamber, the wool is lowered into the dye liquor, and raised a few times until sufficiently coloured, after which it is removed. By means of the air admitted to the skin, the latter is always kept cool and prevented from injury by coming in contact with the hot steam of the dye liquor, so that it is not necessary to remove the skin from the dye vat until the wool is dyed. By the escape of the air without coming in contact with the dye liquor, no trouble arises in consequence of cooling the liquor. This method of dyeing is necessary in the ordinary dyeing processes in order to prevent the skin from being injured by being too long in contact with the heat from the dye liquor, as the wool will not bear too great a heat, and the skin to which it is attached would be shrivelled up if subjected to too great a heat—the heat of boiling water in fact.

After removal from the dye liquor the skins are rinsed, dried, moistened with salt water, and stretched. If patterns are desired on the wool, a copper model is used, shaped to the pattern desired, having a ledge about 1 inch high running round the edges of the model; this pattern is placed over the wool it is desired to protect from the action of the dye, the wool being gathered up and enclosed in the pattern by means of the round edges; the model is strapped on the wool side of the skin, and as a consequence all the wool that is gathered up under the pattern is not subjected to the action of the dye liquor, as it does not come in contact with the dye. A temperature of 130° F. should not be exceeded in dyeing sheep skins for rugs or mats.

Dyeing and Colouring Skins with the Hair or Fur on.—The following processes will enable any kind of pelt to be coloured as desired :—

To Colour Furs.

Method of Use.—Soak in soft water, then wash in middling strong soda and water, and rinse clean. Afterwards apply with a brush, and well rub through the fur down to the pelt, $\frac{1}{2}$ an oz. of crystallised nitrate of silver dissolved in 1 pint of soft water, and hang in the sun to dry. Again apply with a brush, and rub well through the fur, $\frac{1}{2}$ oz. sulphate of potash dissolved in 1 pint of soft water, and hang in the sun to dry. When dry rinse off, and hang in the shade to dry, and work occasionally while drying.

The following is Bugh's method for *Tanning and Colouring Beaver, Otter, or any other skin with the hair or fur on*:—

Method of Use.—Soak the skins (if dry) for twelve to sixteen hours, then flesh them, and again soak six to eight hours longer, then wash them as follows: Take sufficient warm soft water to wash them, to which add sal soda until the water feels slippery, then wash thoroughly; next wash them well in warm strong soap suds, then rinse well through two or three waters, and wring out as dry as possible. The skins are then ready for the tan liquor, which is prepared as follows:—

Ingredients.—2 gallons cold soft water.
 2 lb. Glauber's salt.
 1 lb. alum.
 1 lb. common salt.
 $\frac{1}{2}$ oz. sulphate of zinc.

Method of Use.—Melt 1 lb. terra japonica in $\frac{1}{2}$ gallon of the above preparation over a slow fire, then mix all together. All the ingredients should be pulverised so as to dissolve more quickly. Place the skins in the tan, and handle by pulling and stretching thoroughly, and let remain two or three days, if hairy furs, such as seal skins, four to five days, then rinse in three or four clean waters, wring out as dry as possible, and hang in the shade to dry. When

nearly dry work them occasionally by stretching on the beam with the fleshing knife. When dry finish on the beam by working the middle or thick parts of the skin down until it is even, or as thin as the edges or flanks. A currying knife with a fine edge is the best tool to do this with, or it may be done with coarse sandpaper rolled on a round stick, using it the same as a knife. If it is desired to pluck the hides, wash them thoroughly in alkali, and rinse them in clear cold water for a day or two longer, or until the "guard hairs" pull out without breaking. Care must be taken not to let the skin touch it; if it does it will loosen the fur, as the fur is only on the grain side, while the "guard hairs" go through into the pelt.

To Dye Rabbit Skins Black.

- 1st bath—carbonate of soda, 10 lb.
- 2nd bath—17 lb. extract of logwood.
10 lb. catechu.
2 lb. sulphate of copper.

Method of Use.—Put the skins first in the carbonate of soda solution, rinse them, and then put them for two hours in the second bath before the sulphate of copper is added. During this operation keep the temperature of the bath at 85° F., then take out the skins, cool off, and replace them in the bath, which should be heated to 95° F., and repeat this operation after the copper sulphate has been added, increasing the temperature every time 10° F. up to 120° F., then thoroughly rinse the skins.

To Dye Naturally White Skins Brown, leaving the tips white. To protect the points from the dye cover them with a resist paste made by mixing with water—

Ingredients.—10 parts gum-arabic.

5 parts sugar of lead.

10 parts fat white clay (kaolin).

10 parts acetate of copper.

Carefully dry the skins, then free the fur from oil, and at the same time dye brown by applying silver litharge boiled in a solution of caustic lime, diluted to 4° B., and cooled to 75° F., to the skins. The lead oxide dissolved in the milk of lime forms with the sulphur contained in the fur an insoluble brown sulphide of lead, whilst the excess of milk of lime frees the fur at the same time from the oil.

To completely convert the excess of plumbic oxide in the mixture and in the fur into sulphide of lead, the skins are placed in a revolving drum hermetically closed, and treated with very dilute ammonia sulphhydrate. They are then put into a gallic acid bath, and on neutralising this with lime, brown colouring matter is precipitated on the fur. The paste is then removed by careful washing, and the points, having been neither freed from oil nor dyed, will be found perfectly white. By adding to the gallic acid bath small quantities of hyposulphite of silver and nitrate of bismuth darker tints can be readily obtained.

Black Lacquers.

Ingredients (No. 1).—50 parts turpentine.

400 parts spirits of wine.

50 parts shellac.

20 parts extract of logwood.

6 parts bichromate of potash.

Method of Preparation.—Dissolve the logwood extract in the spirits, then add the potassic salt, and lastly dissolve the shellac in the spirits, and add the turpentine last of all. If a blue-black hue is desired dissolve 1·75 to 3·5 parts of indigo carmine in the ready-made lacquer.

Ingredients (No. 2).—7½ pints spirits of wine.

5 oz. aniline black spirit soluble.

30 oz. ruby shellac.

1 oz. Venice turpentine.

1 oz. gum sandarach.

1 oz. castor oil.

Method of Preparation.—Dissolve the aniline black in the spirit, then dissolve the shellac and sandarach, and when they are dissolved put in the Venice turpentine and the castor oil. The presence of the castor oil renders the lacquer flexible, and prevents it being brittle.

Ingredients (No. 3):—

- | | | |
|-----|---|-----------------------|
| (a) | { | 10 parts water. |
| | | 2 parts borax. |
| | | 2 parts shellac. |
| (b) | { | 2 parts logwood. |
| | | 2 parts water. |
| (c) | { | 1 part green vitriol. |
| | | 1½ parts water. |

Method of Preparation.—Make these separate mixtures, then dissolve the shellac in the water by aid of the borax in (a). Separately boil the logwood in the water (b) and filter, lastly dissolve the green vitriol in the water (c), then mix (a) and (b), and finally pour in (c). This lacquer is not waterproof, but it can be polished by brushing or passing a hot polishing iron over it.

Ingredients (No. 4).—1 part black pitch.

4 parts benzol.

turpentine, 10 per cent.

Method of Preparation.—Dissolve the pitch in the benzol, being careful not to have a naked light in the room.

Ingredients (No. 5).—100 parts methylated spirits.

20 parts shellac.

5 parts gum sandarach.

2 parts gum mastio.

5 parts colophony.

5 parts Venice turpentine.

1 part lamp-black.

Method of Preparation.—Digest at a gentle heat, and well mix by shaking. This is a good lacquer for harness makers.

Bronze Coloured Lacquer for Shoes and Morocco Leather.

Ingredients.—1·1 lb. shellac.
 2·8 oz. aniline blue.
 4·4 lb. water.
 8 oz. borax.

Method of Preparation.—Dissolve the aniline dye in the water, then put in the borax and boil, and while boiling stir in the shellac, and continue the boiling until the shellac has dissolved.

India-rubber Varnish for Leather.

Method of Preparation.—Mix together at a suitable heat equal bulks of caoutchouc varnish and soluble copal varnish.

Finishes for Preserving Aniline Dyes on Skins.

No. 1.—180 grammes gum-arabic in 2 litres of water.

No. 2.—180 grains shellac dissolved in 2 litres spirits of wine.

No. 3.—Add 120 grains of liquid ammonia to 3 litres of water heated to 75° C., and then dissolve in the solution 90 grains of caseine, stir the mixture until the boiling point is reached, then allow to cool, and pour off the clear fluid. For use these fluids are laid on the dyed skins when they are dry, so as to prevent the colour fading.

A softening dressing for aniline dyed skins is made by mixing 10 grammes of yolk of egg and 5 grains of glycerine in 1 litre of water. Rub the skin with this mixture, let it half dry, and then rub it well with a piece of woollen rag only. In finishing the skins after dyeing, dry them on the stretching frame so as to prevent shrinking. While drying at intervals well shake the skins so as to open up the fibre and prevent matting of the fibre taking place. When dry the fibre side should be well brushed to separate the fibres as much as possible, and to soften the skins they may be rubbed on the

flesh side with a little oil or a mixture of oil and egg. Cod oil and castor oil are better than any other oil for softening the skins. As a preservative a little mercury chloride added to the oil will be best; 1 oz. will be sufficient to add to 3 gallons of oil.

Transparent Leather is obtained thus: The skins are depilated, cleansed and stretched on frames, and then a mixture rubbed into them composed of the following—

Ingredients.—1000 parts glycerine at 22 degrees.

2 parts salicylic acid.

2 parts picric acid.

25 parts boracic acid.

Method of Preparation.—Before the skins are properly dry put them into a chamber sheltered from the sun, and then a solution of bichromate of potash is applied to them when they are thoroughly dry. The skins are then covered with a solution of shellac in spirits of wine.

Curriers' Soft Soap for Mixed Upper and Calf Skins.

Ingredients.—60 lb. potash.

85 lb. best tallow.

Method of Preparation.—Dissolve the potash in a suitable vessel by the aid of steam, and when dissolved draw off the lye into another vessel, then add the tallow, heat up for ten to twelve hours in a steam-jacketed pan, adding soft water at intervals until the mixture is of the required consistency.

Cement for Leather or Rubber.

Ingredients.—1 lb. gutta-percha.

$\frac{1}{2}$ lb. india-rubber.

2 oz. pitch.

1 oz. shellac.

2 oz. linseed oil.

Method of Preparation.—Melt together by heating and use hot.

Waterproof Composition for Boots and Shoes.

Ingredients.—4 oz. spermaceti wax.

1 oz. india-rubber solution.

10 oz. tallow or lard.

5 oz. copal varnish.

Method of Preparation.—Melt the spermaceti in the rubber solution, then put in the tallow or lard, and lastly the copal varnish. This compound is laid on the leather with a brush, and if applied to the soles of boots (warmed) the leather is rendered waterproof and more durable.

Renovator for Morocco Leather.

Ingredients.—yolks of 2 eggs.

white of 1 egg.

small piece of sugar.

$\frac{1}{2}$ oz. gin.

ivory-black, q. s.

Method of Preparation.—Mix altogether and use like ordinary blacking.

Glycerine Polish for Leather.

Ingredients.—3 lb. lamp-black.

$\frac{1}{2}$ lb. bone-black.

5 lb. glycerine.

5 lb. syrup.

2 $\frac{1}{2}$ lb. gutta-percha.

10 oz. olive oil.

1 oz. stearine.

5 oz. gum-arabic (dissolved in 24 oz. water).

$\frac{1}{2}$ oz. oil of lavender.

Method of Preparation.—Mix the blacks with the glycerine and syrup, separately melt the gutta-percha until it flows easily, then add the oil to it; when well mixed put in the stearine; while this solution is warm mix it with the glycerine compound, then put in the gum mucilage, and lastly the essential oil to perfume it. Dilute with three or four times its volume of water for use.

To Taw Skins.

Ingredients.—9 gallons water.

9 oz. alum.

5 oz. nitrate of potash.

3½ oz. chloride of sodium.

9 oz. carbolic acid.

Method of Preparation.—Mix all the above ingredients and then steep the skins in the compound for thirty-six hours, handling them now and again. Then remove from this compound, stretch them on drying boards, and allow them to dry in the sun or in a warm place; when dry rub the skin on the flesh side with pumice stone.

To Prepare Sheepskin for Mats.

Method of Preparation.—Make a strong lather with soap and hot water, and let it stand until cold, wash the fresh skin in it, carefully squeezing out all the oil and dirt from the wool, wash it in cold water until all the soap is taken out. Let it soak for twelve hours, and hang it over a pole and drain. When well drained stretch it carefully over a board frame to dry, and repeat the stretching several times while drying. Before it is quite dry sprinkle on the flesh side 1 oz. of alum and 1 oz. of saltpetre, rubbing them well into the flesh. Try the wool to see if it be firm on the flesh; if not let the mixture remain a day or two, and then rub again with alum, fold the flesh side together, and hang in the shade for two or three days, turning it over each day until quite dry. Scrape the flesh side with a blunt edged knife, then rub with pumice stone or rotten stone (Tripoli powder). Fur skins are tanned by first removing all of the useless parts and softening the skin by soaking in cold water, then remove the fatty matter from the flesh, and soak in warm water for half an hour. Next mix equal parts of

borax,

saltpetre,

sulphate of soda,

in sufficient water to make a thin paste, spread this with a brush over each skin, applying more to the thicker parts than to the thinner. Double the skins together, flesh side inwards, and put in a cool place. After remaining for twenty-four hours wash the skins clean and apply in the same manner as before a mixture of

- 1 oz. of common washing soda,
- ½ oz. borax,
- 2 oz. white hard soap,

melted slowly together without being allowed to boil, fold together, and put in a warm place for twenty-four hours. After this dissolve

- 4 oz. alum,
- 8 oz. salt,
- 2 oz. cream of tartar,

in sufficient rain-water to saturate the skin; when cool enough not to scald the hands, soak the skin in it for twelve hours, then wring out and hang up to dry. When dry repeat the soaking and drying two or three times until the skin is sufficiently soft. Lastly smooth the flesh side with sand-paper or pumice stone.

To Tan a Hide with the Hair on.

Method of Preparation.—When taken from the animal soak in cold water to remove the blood and dirt, then spread it flesh up, and put upon it

- 2 parts salt.
- 2 parts nitrate of potash and alum combined.

Make it fine and sprinkle it evenly over the surface. Roll it up and let it remain in a cool place for a day or two until the ingredients are dissolved, then take off the flesh and nail the hide to the side of an outhouse in the sun, stretch it tight to make it soft like harness leather, apply neatsfoot oil, and again fasten it up exposed to the sun, then rub

out all the oil you can with a wedge-shaped stick or worn knife, and the hide is finished.

Bleaching Fluid for Hemlock Leather.

Method of Preparation.—Mix together equal weights of

Methylated spirits.

Hypochlorite of soda.

Hydrochloric acid.

Cements for Leathers.

No. 1.—Soak equal parts of glue and isinglass in water for ten hours, pour off superfluous water, and then gradually melt them by slowly heating, and mix in tannic acid until the mass becomes ropy or coagulated like the white of an egg. To use the cement roughen the surface of the leather to be joined, put a layer of cement on this hot and clamp firmly.

No. 2.—Mix 10 parts of bisulphide of carbon with 1 part of turpentine, and then add sufficient gutta-percha to make a tough thickly flowing fluid. Before using this cement free the surface to be joined from grease. To effect this sprinkle a little bicarbonate of soda, carbonate of ammonia, or borax on the surface to be joined, lay a cloth over them, and then place a hot iron on top, and keep it there a short time so as to cause the alkali to cut the grease, then put the cement on both surfaces to be joined, put them together and then subject to pressure until they are cemented.

No. 3.—Gutta-percha dissolved in bisulphide of carbon to the consistency of syrup is also a good cement for joining leather. The parts to be joined should be well covered with cement so as to fill the pores of the leather, then the cement is heated, and the parts hammered until the cement is cold.

No. 4.—To join Leather to Metal with hot solution, steep

the leather in an infusion of nut galls (hot), and bring the two together.

Ingredients (No. 5).—16 oz. gutta-percha.
4 oz. india-rubber.
2 oz. pitch.
1 oz. shellac.
2 oz. linseed oil.

Method of Preparation.—Heated together, remelt for use.

No. 6.—*To join Leather to Metal*.

Method of Preparation.—Melt together equal parts of asphalt and gutta-percha, and apply hot under pressure.

No. 7.—*To join Leather to Pasteboard*.

Method of Preparation.—Dissolve 50 parts of strong glue with a little water at a gentle heat, then add a little Venice turpentine, and next a thick paste made with 100 parts of starch in water; apply quickly when cold.

Another Formula for a similar cement is this:—

Ingredients.—2 pints of rye whisky.
1 pint water.
4½ oz. powdered starch.
1½ oz. good glue.
1½ oz. Venice turpentine.

Method of Preparation.—Mix the whisky and water together, then stir in the starch and make a thick paste. Separately dissolve the glue in an equal weight of water, and mix the Venice turpentine therein, mix thoroughly, and then compound this mixture with the thick paste by constantly stirring until all is well incorporated.

Black Kid Reviver.

Ingredients (No. 1).—4 parts logwood.
½ part sulphate of iron.
40 parts water.

Method of Preparation.—Boil for half an hour and then strain into tragacanth powdered ($\frac{1}{14}$ th part) 1 part soap and 3 parts glycerine. Add 1 fluid pint methylated spirits containing $\frac{1}{2}$ pint salicylic acid, 4 minims oil of gaultheria, and add water to make 40 fluid pints.

Ingredients (No. 2).—40 oz. vinegar.

1 oz. iron filings.

1 oz. sulphate of iron.

1 oz. logwood.

3 oz. bruised galls.

To Preserve Egg Yolk.

Ingredients.—1 lb. egg yolk.

$\frac{1}{2}$ oz. common salt.

$\frac{1}{2}$ oz. starch.

Method of Preparation.—Rub up together in a mortar, and when the mixture thickens pour it into moulds and dry in the air. This dried yolk answers as well as fresh.

To Protect Furs against Moths and Insects.

Method.—For 100 small skins use with the tanning liquor a mixture of

$\frac{1}{2}$ pint turpentine.

$\frac{1}{2}$ pint weak solution of carbonate of soda.

1 pint concentrated decoction of wormwood.

The usual tanning method is followed. For larger skins (calf or sheepskins) take

2 lb. turpentine.

4 lb. soda lye.

8 lb. wormwood decoction.

To Imitate Sable Skin prepare a mordant of

1 part quicklime.

10 parts water.

Method of Use.—Apply this with a brush to the fur side of the hamster skin, and allow to remain for twelve hours, then dye the skin in the following preparation :—

Pulverise and mix—

- 3 lb. roasted gall nuts.
- $\frac{1}{2}$ lb. sal ammonia.
- 15 lb. sumach.
- $1\frac{3}{4}$ lb. sulphide of antimony.
- 2 lb. verdigris.
- 10 lb. iron scales.
- 4 lb. copper ash.
- 10 lb. clay.
- 12 gallons water.

Method of Use.—Mix well and apply a layer of this to the skins, and after twenty-four hours place every two skins with the fur side together, let them lie for twenty-four hours, and then beat them. Repeat the whole process until the desired colour is obtained. Finally clean the skins by putting them in the tumbling wheel or drum filled with sand and mahogany sawdust.

Decorative Gilding on Leather.—Gold leaf, silver and other bronzing powders may be affixed on leather by the following process :—

Free the tanned leather from all fatty bodies by soaking it in a medium strong bath of caustic soda for a time, according to its thickness, then take it out and dry it; afterwards saturate it with a solution of isinglass and alum. Dry it in the air, and then give it one or two coats of a mixture of

- 2 lb. collodion.
- drachm castor oil.

Dry again and then brush with a weak solution of caoutchouc in benzol. Then apply the gilding varnish, which is prepared from old linseed oil varnish boiled with litharge and Venice turpentine. When the varnish is dry so that it is only slightly sticky, lay on the gold leaf or bronzing powder

with a brush, and finally give a coat of mastic resin dissolved in alcohol.

To Harden Hemlock Tanned Sole Leather prepare as below—

8 oz. slaked lime.

2 lb. sal soda.

$\frac{1}{2}$ gallon water.

Boil together, cool, and add—

8 oz. slaked lime.

$\frac{1}{2}$ gallon water.

Steep the leather in this for three days, then lift out and put into a bath of

3 lb. slaked lime,

$1\frac{1}{2}$ gallons water,

and let it soak in this for from two days in summer to three or four days in winter. When taken out of this pass through water heated to about 180° F., and then press between heavily weighted rolls, or if a denser material is required press by hydraulic pressure.

To Renovate Buckskin Shoes, etc.

Method of Preparation.—Wet the surface well with alum water, and when nearly dry brush with a decoction of logwood boiled and filtered, to which is added a little acetate of iron.

Renovating Paste for Patent and Enamelled Leathers.

Method of Preparation.—Melt pure wax and put in some olive oil, and then some lard, and mix over a gentle heat, then put in some oil of turpentine, and finally some oil of lavender. Apply this paste with a rag, and polish by rubbing with a soft cloth or piece of flannel free from fluff.

Edge Stain for Black Harness.

Ingredients.—1 gallon water.

$\frac{1}{2}$ lb. logwood extract.

Method of Preparation.—Boil until the extract is dissolved, then put in

8 oz. sulphate of iron,
 $\frac{1}{2}$ oz. gum-arabic,
 $\frac{1}{2}$ oz. bichromate of potash,

and shake up well for use.

To render Sole Leather Waterproof.

Method of Preparation.—Warm the leather and then give a coat of copal varnish, and repeat the operation until the leather is saturated.

White Bottom Wash for Sole Leather.

Ingredients.—4 oz. borax.
 4 oz. oxalic acid.
 1 gallon water.

Do not let the acid predominate.

Method of Use.—For use sandpaper the sole of the boot, then wet it with the above fluid, and when nearly dry lay on French chalk, pipeclay, or bottom ball in the usual way. A little turmeric root or Chinese yellow may be mixed with the fluid to produce a yellow tone.

White Bottom Finish.

Ingredients (No. 1).—40 oz. French chalk.
 3 oz. yellow ochre.

Method of Preparation.—Mix in water to make a paste, then reduce with 1 gallon water made sky-blue with common laundry blue, $\frac{1}{2}$ oz. saturated solution of oxalic acid, and $\frac{1}{2}$ gallon thin gum tragacanth mucilage. Give two coats, allowing the first to dry before laying on the second.

Ingredients (No. 2).—16 oz. French chalk.
 8 oz. common chalk.
 8 oz. alcohol.
 $\frac{1}{2}$ gallon sky blue water.
 $\frac{1}{2}$ oz. dissolved oxalic acid.
 gum tragacanth mucilage, q. s.

To Clean Furs.

Dark.—Make a lot of new bran hot in a suitable pan, being careful that it does not burn, and when well heated rub thoroughly into the fur, and repeat two or three times. Shake the fur and brush briskly until free from dust.

Light.—Lay the fur on a table, and rub it with bran moistened with water. Rub until dry, then rub with dry bran. Use flannel for rubbing with the wet bran, and book muslin for the dry. After using the bran rub with magnesia. Dry flour may be used instead of wet bran. Rub against the way of the fur.

Glove Cleaner.

Ingredients.—3 oz. white Castile soap.

2 fluid oz. javelle water.

2 fluid oz. water.

1 drachm liquid ammonia.

Method of Preparation.—Dissolve the soap in the water by the aid of heat, and when nearly cold add the javelle water and ammonia, so as to make a paste. For use rub this paste on the glove with a piece of flannel, the glove being stretched on the hand or a wooden glove hand.

To Clean Wash Leather or Doeskin.

Wash the leather in lukewarm soft water with a little Castile or curd soap, ox gall or bran tea, then stretch over a wooden hand, or pull them into shape without wringing them. Next rub them with pipeclay, yellow ochre or water, or a mixture of this, in any proportion to suit the shade, made into a paste with ale or beer. Let them dry gradually, and when about half dry rub them well so as to smooth them and put them into shape. When they are dry brush out the superfluous colour, cover them with paper, and smooth them with a warm (not hot) iron.

Another process is to rub into the leather a mixture of

finely powdered fuller's earth and alum, sweep it off with a brush, sprinkle this with a mixture of dry bran and whiting, and lastly dust this off well.

A Grease Extractor for Leather is benzine. Nothing better unites with grease than this fluid, and by solution carries off the grease. The fluid is very volatile and inflammable, and should not be used in a room where there is a naked light or fire, and to use the fluid the article to be degreased should be steeped in the benzine in a covered vessel for some time and then taken out and exposed to the air. Alkaline grease extractors often prove injurious to leather.

Wool Washing Compound.

Mix together—

1 part dry powdered soap.

1 part rock ammonia.

3½ parts dried soda crystals.

Method of Preparation.—Mix together and make into a lye with warm water for use.

Mordant used in Dyeing Russia Leather.

Method of Preparation.—Make 1 oz. of nitric acid hot, and then pour into it 18 oz. of salt of tin (i.e., tin salt or stannous chloride), stir this mixture while adding the tin salt, and make it in the open air so as to avoid inhaling the fumes that are given off. Stir carefully so as to allow these poisonous fumes to escape, and when the mixture begins to whiten add 4½ oz. of fuming hydrochloric acid, and stir carefully for a few minutes. When the mixture is cool put it up in well-stoppered bottles. For use dilute with twelve to fifteen times its own weight of pure water. This mordant is applied to the leather very briskly and uniformly with a brush, and the colouring matter to use on Russia is 18 oz. sandal-wood boiled for one hour in 1½ gallons of pure water, the liquor filtered and 1 oz. of prepared tartar and soda dissolved in

it. Then the mixture is boiled for one hour, and left to rest a few days before using it. The sides destined for black dyeing are only oiled on the flesh side, which must be dried with a woollen rag, leaving the grain half moist and irreproachably neat. Then two or three applications of the above mordant is given, and then several applications of the warm dye, the temperature of which is raised if necessary (i.e., the dye must only be applied while warm), and if the operation takes too much time, according to the number of skins, the dye must be kept at the proper temperature. The application of the mordant and dye is done with a brush by rapidly spreading the liquid which is poured on the leather. The first application of the dye is made immediately after the mordant, and while the leather still retains some of the moisture. After dyeing the leather must be slightly moistened on the flesh side with some tan juice, and dried and then grained. The odour of Russia leather is improved by means of birch tar oil being mixed with this tan juice. For a brilliant gloss on the leather a coating of gum dragon mucilage, not too strong nor too weak, is laid on with a sponge.

The dyeing of Russia leather by means of aniline dyes is accomplished by using 1 part of Russia leather red G, B, or R in 100 parts of water. This solution is mixed with more or less water for dyeing, and the first application is a very weak solution, the next one is stronger, and the last application of dye liquor a very concentrated solution.

For yellow and brownish shades 1 part of phosphine orange in 500 parts of water is used, the bright colour of which may be subdued by giving an application of bichromate of potash solution to the dyed skin. The mordant to use with the aniline dyes in colouring Russia leather is phosphate of soda alone, or with a little dextrine, or else sulphate of soda (Glauber's salt). These levellers produce a uniform coloration.

To Cure Light Skins with the hair or fur on.

1 bushel wheat bran.

12 gallons water (hot).

Method of Preparation.—Let this stand in a warm room, and stir it until the mixture ferments, then strain out the liquid and dissolve therein—

4 lb. chloride of soda,

1½ lb. sulphuric acid,

and stir the mixture. Put the skins, having soaked and fleshed them, into the liquid, and handle them from one to three hours, according to the thickness, then rinse and hang out to dry in the shade. When nearly dry stuff them with a compound of flour paste and tallow, equal parts, in which a mixture of $\frac{2}{3}$ part fish oil and $\frac{1}{3}$ part of spirits of wine have been added.

General Formula for Tanning or Currying Fur Skins.

Method of Preparation.—Flesh the skins in the usual way, and soak them in warm water for two hours, then mix equal parts of

Borax,

Nitrate of potash,

Sulphate of soda,

in the proportion of 1 oz. of each for three skins. Make this into a paste with a little water, and spread it on the flesh side of the skin. Fold the flesh side in, and put aside in a cool place. In twenty-four hours wash the skin clean, and apply the following mixture in the same way as before:—

1 oz. crystallised carbonate of soda.

$\frac{1}{2}$ oz. borax.

2 oz. curd soap.

Melt together without being allowed to boil, and fold together and set aside in a warm place for twenty-four hours.

Lastly dissolve

3 oz. alum,

7 oz. salt,

1½ oz. cream of tartar,

in hot water to saturate the skins, and when blood warm put the skins in it and allow them twelve hours to soak, then wring out and hang up to dry. When dry repeat the soaking and drying two or three times until the skin is sufficiently soft. Lastly smooth the flesh side with pumice stone or glass paper.

Indian Tan for Buckskin.

Method of Preparation.—Flesh the skin with a dull knife, spread the skin on a smooth log, and grain it by scraping with a sharp instrument. Rub nearly dry over the oval end of a board held upright. Take the brains of a deer or calf, dry by the fire gently, put them into a cloth, and boil until soft. Cool off the liquid until blood warm with water sufficient to soak the skin in, and soak until quite soft and pliable, and then wring out as dry as possible, wash in strong soap suds, and rub dry and smoke well with wood smoke. Oil or lard may be used instead of brains, and the skin steeped therein twenty-four hours.

Preservative Compound for Furs and Skins.

Mix together in the powder state:—

Ingredients (No. 1).—1 lb. yellow soap.

1 oz. lime.

1 oz. camphor.

1 oz. arsenic.

1 oz. alum.

Method of Use.—Remove all flesh, etc., from the skin, and then well rub the above compound in the flesh. Do not allow the mixture to get in any cuts in the hands as the arsenic is deadly poisonous.

No. 2.—Reduce to a powder and well rub into the flesh side:—

- 2 drachms sulphur (sublimed).
- 2 drachms nitrate of potash.
- $\frac{1}{2}$ oz. black pepper.
- $\frac{1}{2}$ oz. camphor.
- $\frac{1}{2}$ oz. bichloride of mercury.
- $\frac{1}{2}$ oz. burnt alum.
- $\frac{1}{2}$ oz. tobacco.

No. 3.—Mix together—

- 1 oz. bichloride of mercury.
- 3 drachms hydrochloric acid.
- 2 oz. methylated spirits.

Method of Use.—For use put sufficient of the mixture into a suitable porcelain vessel, and lay it freely over the flesh side with a brush.

Moth Destroyer—Paper.

Method of Preparation.—Dissolve camphor in turpentine, equal weights of each, steep blotting-paper in the mixture, allow it to dry, and then lay the camphor paper amongst the furs it is desired to protect from moths.

Moth Destroyer—Powder.

Mix together and sprinkle on the furs—

- Ingredients.*—1 drachm lupuline (*i.e.*, flour of hops).
- 2 oz. snuff.
 - 1 oz. camphor.
 - 4 oz. cedar sawdust.

Moth Destroyer—Liquid.

Use the following fluid either as a spray, or else saturate blotting-paper with it, and lay same amongst the furs:—

- Ingredients.*—1 oz. carbolic acid.
- 1 oz. camphor.
 - 1 pint benzine.

*A Moth Destroying Powder for Sachets.***Break up and mix—**

Ingredients.—100 parts patchouli herd root.
 50 parts valerian.
 40 parts camphqr.
 50 parts orris root.
 50 parts sumbul.
 1 part oil of patchouli.
 1 part otto of roses.

Method of Preparation.—Mix the oils with the orris root powdered, and then mix all together.

Liquids for Destroying Moths.

Ingredients (a).—2 parts oil of cassia.
 2 parts oil of bergamot.
 5 parts camphor.
 20 parts ether.

Dissolve together and then mix the fluid with—

20 parts carbonate of ammonia.
 20 parts orris root.

Ingredients (b).—500 parts methylated spirits.

10 parts naphthalene.
 10 parts carbolic acid.
 5 parts camphor.
 5 parts essence of lemon.
 2 parts oil of thyme.
 2 parts oil of lavender.
 2 parts oil of savine.

Method of Use.—Use a spray distributor.

CHAPTER VI.

CHROME TANNAGE.

THERE have been many attempts to produce leather by mineral agents instead of vegetable tanning matters. Of all these processes, the leather which is produced by salts, of which chromium is a component, is the only one of these processes which have survived the experimental stage sufficiently to become a recognised commercial product. At the present time, however, the subject of chrome tanned leather is still in a transition state, as all the capabilities and manipulative processes incident to these leathers have not yet become reduced to strictly scientific rules. As, however, the subject of chrome tanning is one that will grow in importance, we have in this chapter put before the reader in a succinct way the facts concerning the production and adaptability of this class of leathers.

One of the earliest chrome tanning methods was that of Heinzerling. By his method the skins are cleansed, depilated and swelled, and then put in a $\frac{1}{2}$ per cent. solution of chromic acid, or in a $\frac{1}{2}$ per cent. solution of potassium bichromate, soda bichromate or magnesia bichromate, or else some other neutral bichromates, or in a $\frac{1}{2}$ per cent. solution of chromic salts. For instance, sulphate of chromium (chrome alum), the addition of 1 per cent. of common alum (sulphate of aluminium), and 1 per cent. of sodic chloride, is an advantage. The length of time which the skins or hides remain in the solution depends on their thickness.

While they are in this tanning solution it should be successively concentrated until it contains as much as 8 per cent. of chromates, 12 per cent. of alum, and 10 per cent. of common salt. For the production of black leathers (*i.e.*, if the leather is to be blacked after tanning) 2 to 3 per cent. of ferricyanide of potassium, or of ferrocyanide of potassium (*i.e.*, red or yellow prussiate) is added to the solution. Without such addition it is not easy to convert the leather into a good black, because the chromic salt leaves the leather of a slightly greenish tinge. After removal from the above tanning solution the skins are placed in a 4 to 8 per cent. solution of chloride of barium, sugar of lead, or soap, which partially fixes the mineral tanning substance in the fibre of the leather, and forms thinly insoluble salts or mineral soaps. After removal from this solution the skins are washed, superficially dried, and stretched, and while still slightly moist placed for thirty-six hours in a solution of stearine, paraffin wax, resin, colophony, spermaceti, or some other hydrocarbon, or put in benzine or some solvent having a similar effect of preventing the mineral salts rendering the leather fibre brittle.

After removal of the skins from the hydrocarbon solution, the leather which is intended for uppers and belts is greased in the same manner as leather tanned in the usual way, with a mixture of tallow, sperm oil, or similar stuffing grease, and the leather is then either filled in or allowed to soak in by hanging the skins in a moderately heated room. In preparing black grain leather it is best to blacken the skins before placing them in the fat solution. For blacking, on account of the yellow or greenish ground being more difficult to blacken, the application must be repeated once or twice oftener than for leather tanned in the ordinary manner. If the leather is to be blackened after greasing and currying, the fat should first of all be thoroughly removed by scouring

with dilute solution of soda or ammonia, and rubbing with pumice stone powder or wood ashes. The grain side is then blackened with logwood extract or iron black.

One of the most recent patents for chrome tannage is that taken out by Mr. William M. Norris (an American manufacturer, in August, 1897). By this patent there are certain improvements made in the tanning methods adopted. To go into detail is outside the scope of this chapter, therefore the reader is referred to specifications of the English and American patents connected with the production of chrome leather. It is more to the interest of our readers to show the methods by which the chrome leather can be worked up into articles of utility. When first introduced chrome tanned leather was considered a wonderful advance on vegetable tanned stock, because the former kind of leather was considered to be waterproof, or rather impervious to water. Later experience has shown that for foot gear such waterproof leather is rather a disadvantage than otherwise, because it is as bad for the feet as encasing them in india-rubber goloshes. For football boots, shooting and fishing boots, etc., the waterproof qualities of chrome leather is a recommendation. It is now, however, discovered that chrome tanned leather is not absolutely waterproof or impervious to water, because as a matter of fact it does allow a slight penetration of water, but so slowly, however, and in such a small degree, that, practically speaking, chrome tanned stock may be considered waterproof. One quality, however, which chrome leather has over other kinds of tanned leather, is that chrome leather is not soluble in boiling water nor affected thereby. With vegetable tanned stock, boiling same in water will cause it to shrink and become hard and horn-like in nature, whereas chrome tanned leather shows no signs of being affected, no matter how long it is boiled in water.

Practically speaking, chrome leather is *tanned* leather, not *tanned* leather. It is identical in many respects with alum or glove leathers. By the aid of alum or alumina salts the fibre of skins become tawed or converted into leather, and if such leather be well impregnated with tallow soap, afterwards it will become practically waterproof or water repellent.¹ With alum leather the colour is white, whereas with chrome leather, owing to the green colour of chromic acid, which is the chief ingredient in converting animal fibre into leather, chrome leather bears a faint greenish colour. It is also owing to the formation of insoluble mineral salt in the fibre that chrome stock requires special treatment to colour the leather.

The following digest of a short treatise on the subject of dyeing chrome leather, by Mr. Walter Towse, will aid the dyer and currier in his manipulation in colouring chrome stocks.

Colouring Chrome Leather with Aniline Dyes.—Acid dyes produce the best results when the leather has been treated to the mordanting action of vegetable tanning materials, such as tannic acid, but as tannic acid contracts the animal fibre it is better to select more suitable dye stuffs, although some of the acid aniline dyes give very good shades on chrome calf when applied directly. Others require the leather to be previously prepared with tannic acid. For example, the acid violets, naphthol blues, naphthol and naphthylamine blacks, appear especially suitable for direct dyeing, and in the case of the blacks in particular superior results were obtained by this method than by that in which vegetable

¹ It is a fact worth knowing by glove leather makers that glove kids can be rendered waterproof by rubbing them with a lather of curd soap and drying them. This in no way affects their colour or methods of dyeing the leather.

tanning materials were used. Naphthylamine black 4 B, for instance, gave a good deep blue-black when applied directly, whereas by the latter method only a pale greyish-blue shade was produced. Naphthol and anthracite blacks exhibit similar difficulties, acid green and soluble blue yield much purer and more level shades when dyed on a tannic bottom. A more striking difference is observed in the case of the patent blue, which gives full and level shades by the latter method, but only very pale shades when dyed directly. With few exceptions all the yellows, oranges, scarlets, reds and browns, produce purer and more level colours in the presence of tannic acid.

As regards *Basic Colours* numerous attempts have been made to apply these colours directly to chrome leather, but without success, and the results obtained indicate very conclusively that they are not appropriate colouring matters for this kind of leather in its original condition. Basic colours, as is commonly known, will only dye satisfactorily on those fibres possessed of an acid nature of themselves, or to which this character is imparted by the use of weak acid mordants. Those most commonly employed for this purpose are vegetable tanning materials, soaps and oils, the acid constituents of which (tannic acid in the former, stearic, oleic or ricinoleic acid in the latter) combine readily with these colours. One per cent. solution of basic aluminium sulphate and basic chromic alum (5 parts metallic salt plus $1\frac{1}{2}$ soda crystals) gives good results. A 1 per cent. solution of alum and salt also answered the purpose very well. It appears that the chromic oxide on the fibre also acts to some extent as a fixer, but it is found that the subsequent treatment renders the excess of base insoluble, and at the same time yields colours which are much deeper and faster to the various influences to which the leather may be subjected. All the basic colours applied to chrome leather by this method give

perfectly full and level shades when sufficient care is exercised in mordanting and fixing.

Fat Liquoring.—After chroming it is very frequently desirable to increase the softness and pliability, and at the same time give plumpness to the leather. Fat liquor for blacks usually consists of emulsified mixture of soft or curd soaps, with cod or neatsfoot oils, the proportion of soap and oil varying according to the finish required. In the fat liquoring of coloured goods it appears that greater care must be taken, and the process should be modified according to the particular class of colours required.

As regards acid colours, it is found that very few acid colours resist this after treatment without undergoing some modification. The after treatment consists of rinsing the coloured leather in water, drying, and comparing with the original colours. In the majority of cases the patterns show a great loss of colour, while in other instances the colour is almost completely stripped from the fibre. The alkaline fat liquors generally manifest a greater deleterious effect than the neutral, but with some colours no appreciable difference is observed. Colours which have a tendency to bronze (*e.g.*, magenta, blue and green) are better dyed in a slightly acid bath (1 c.c. acetic acid, 8° Tw., per litre, or about 1½ oz. per 10 gallons).

By passing the dyed goods a second time through a tannin bath, much faster shades are produced. Of course this after treatment would have a tendency to lighten the shades somewhat. Consequently this should be borne in mind and allowed for in the dyeing.

In summarising the results obtained it appears that—

(1) The method to be adopted in the colouring of chrome leather will depend on the dye-stuffs used (acid or basic) and also on the purpose for which the goods are intended.

(2) The acid colours on account of their fugitiveness to

soaping, should be applied after fat liquoring, care being taken to avoid the separation of fatty matters.

(3) The presence of tannic acid in the leather is very beneficial in the dyeing when using basic colours.

(4) The basic colour can be successfully applied by a tannin and tartar emetic bottom, and the shades produced resist, in most cases, the fat liquoring treatment.

(5) The basic colours can be satisfactorily applied after fat liquoring, provided tannic acid and a metallic salt form the mordant.

Chromic tanned leather, if freed from acid, may be dyed at once, but if a mordanting fluid of tartar emetic be given, then clearer tones may be obtained.

To dry chrome tanned leather with alizarine colours it is best to mordant it either with sulphate of alumina, tin salt, or bichromate and iron, all in the presence of acids. In this case a temperature not exceeding 140° F. (60° C.) is required.

A very simple method to adopt is to soak the leather with salts of soda (sulphate or phosphate), and then treat the leather with a chrome mordant, when acid dyes will readily take on the leather. Strong bark darkens the natural colour of the leather, which can again be lightened by the addition of a little acid to the dye bark, thereby enabling the dyer to obtain mode shades at will. Without the addition of the acid the dyes take well and uniformly, but are darker and duller in tone. At the same time there is a saving of dye.

In order to get a yellowish-brown on chrome leather prepared with strong solution and on a dark ground it is only necessary to use a pure yellow, say an azo acid yellow. Curcumine extra gives a reddish shade in combination with the natural colour of the yellow. Reddish brown of different shades is obtained with ponceau 4 G B, ponceau 3 R B, fast brown G. A full green is obtained by Guinea green

B, which can be changed to an olive by the addition of yellow or brown. Fast blue 6 B answers well for navy blue, and wool black 4 B furnishes a black equal to logwood black. To obtain fair and clear coloration mordant the leather with dilute acids before applying the above dyes. The temperature required in dyeing with acid dyes is 122° F. (50° C.). If dyed in pairs keep the flesh sides together, if singly, dye by the brush or sponge. After dyeing and drumming give a smear of linseed oil, and when that has penetrated the skin, iron them on the grain side, and grease them, when they will be ready for use.

One of the greatest troubles that beset the dyer of chrome stock is the production of a good rich deep black on chrome leather. W. M. Norris of New Jersey (U.S.A.) manufactures a special black dye for chrome stock, which is a pure iron liquor, and contains no free or uncombined acid. It strikes with logwood a very deep blue body, with a decided brownish bronzy coat, which changes to a brilliant lustrous black by exposure to the air and glazing. It is not very rich, but as clean and as clear as pure water. It is a remarkably soft black, never fades, and retains its colour and softness no matter how long stock is stored.

The maker has made many researches on the production of a good rich black on chrome tanned stock, but finds the above all that can be desired.

CHAPTER VII.

USEFUL INFORMATION.

A SOAP paste for dyeing leather and textiles is the subject of a German patent. The paste is prepared on the following lines. A suitable soap (such as tallow or fat soap) is dissolved in an excess of alcohol, and at the same time the aniline dye colouring matter is mixed in the alcoholic solution of soap, the weight of dye used being equal to that of the soap. Separately another solution is prepared from glue, gelatine, or other suitable binding material, the quantity of glue or gelatine used being equal to or less than that of the soap. In this glue solution the necessary mordanting material, equal in weight to the soap, is added. Such mordant consists of either acetate of sodium or of ammonia, sulphate, phosphate, or chloride of sodium, or any other suitable mordant. Then mix this glue and soap solution, and add glycerine up to one-third the weight of the soap. After this has been dissolved slightly heat the mixture, stirring meanwhile, and gradually raise the temperature until the mass becomes homogeneous, and about two-thirds of the alcohol employed has been distilled off. Then pour out the mass, and when cold cut up into cakes. For use the paste is dissolved in hot water to make a suitable dye liquor, and the leather is dyed by dipping or painting.

*Russet Leather Dressings.**Ingredients.*—16 oz. blood albumen.

1 gallon water.

16 oz. granulated gelatine.

1 gallon water.

1 quart of bleached shellac, dissolved in alcohol.

1 pint liquid ammonia.

 $\frac{1}{2}$ gallon hot water.

Method of Preparation.—Mix the ammonia with the $\frac{1}{2}$ gallon of water, and then stir in the shellac and boil up. Separately dissolve the gelatine in 1 gallon of water, and the blood albumen in the other gallon, and add these solutions to the shellac; mix until homogeneous, and when cool it should be like a jelly. It is used by laying on with a sponge.

*Wax Polish for Russet Shoe Leathers.**Ingredients.*—1 lb. yellow wax.

2 oz. pearl ash.

1 oz. yellow soap.

48 fluid oz. water.

32 fluid oz. turpentine.

16 grains phosphine (aniline) dissolved in 2 oz. alcohol.

Method of Preparation.—Mix the wax, soap, pearl ash, and water together by boiling them until a homogeneous cream is obtained, then remove from the fire, and add the turpentine, and lastly the phosphine tincture. Stir well to thoroughly incorporate, and then make up to five pints with water.

*Staining Rein and Bridle Leathers.**Saffron Stain.* (No. 1.)

Boil 2 oz. of saffron in

120 fluid oz. water

for fifteen minutes, and strain. Shade this into suitable tones by mixing it with Spanish annotta.

Saffron Stain. (No. 2.)

Ingredients.—1 oz. saffron.
 $\frac{1}{2}$ oz. cochineal.
 1 gallon water.

Method of Preparation.—Boil all together for twenty minutes and then strain.

An annota stain is prepared by slicing up 16 oz. of Spanish annotta and boiling it until dissolved in 1 gallon of water, then straining and adding a little salts of tartar.

Phosphine Stain.

Method of Preparation.—Boil 1 oz. of phosphine in 1 gallon of water for ten minutes, and add 2 oz. of lump sugar and strain. This stain may be shaded off with Bismarck brown.

For a green stain boil 1 lb. of turmeric powder in $\frac{1}{2}$ gallon of water for fifteen minutes, and then add 12 oz. of indigo blue paste, and stir well.

Russia Red Stain.

Boil 24 oz. of sandal-wood in
 2 gallons water for 1 hour,

then strain, and add $1\frac{1}{2}$ oz. of prepared tartar and soda, and boil for forty minutes. Use with an alum mordant. If the leather has not been sumached, it will generally require mordanting before the above stain will strike. A good mordanting fluid is prepared by dissolving $\frac{1}{2}$ lb. of common soda in 1 gallon of water, and adding 4 to 6 fluid oz. of liquid ammonia. Sometimes a weak solution of soap, or of sulphate of zinc and acetate of lead in solution.

Renovator for Patent and Enamelled Leathers.

Method of Preparation.—Boil together

8 oz. treacle or sugar.
 1 lb. gum-arabic.
 2 lb. ivory-black.
 water, q. s.

Another Polish for Patent Leather.

Method of Preparation.—Dissolve 8 oz. of gum-arabic in 20 fluid oz. of water. Mix in 2 oz. of treacle, $\frac{1}{4}$ oz. of lamp-black, grind up in 1 oz. olive oil, and then add 1 oz. of vinegar, and 2 oz. methylated spirits. Shake until homogeneous.

Russia Odour.—The peculiar odour of Russia leather was for a long time jealously guarded as a great secret. It is due to the impregnation of birch tar oil in the leather, but by the usual method of using this oil the odour has a tarry smell. By means of the following method, however, the delicate odour of refined birch tar-oil is obtained.

Method of Preparation.—Dissolve about 4 oz. of caustic soda in 1 pint of 95 per cent. alcohol, and stir this into 25 gallons of water. After treating the leather to the birch tar oil in the usual way, dip it into the above soda bath, when the oil will lose its acrid or tarry smell.

Black Wax.

Boil together slowly—

- 1 gallon pure tar.
- 4 lb. refined beeswax.
- 4 lb. mutton tallow.
- 2 lb. resin.
- $1\frac{1}{2}$ lb. lamp-black.

When homogeneous and cool mould into cakes.

Curriers' Stuffing for Satin Hide.

Ingredients.—90 lb. wool grease.
20 lb. English cod oil.
115 lb. lard grease.

Method of Preparation.—Mix together by heating and stirring. The above is for 500 lb. weight of damp leather, and the stuffing is effected thus: Heat the grease to 125° F., and the stuffing wheel to 130° F. Put the grease in the wheel

first, and then put the leather in, and run for thirty-five minutes, then take out and hang up to cool.

Seasoning and Blacking for Satin Hide.

Method of Preparation.—Put 2 parts of logwood chips and 7 lb. of soda crystals (common washing soda) in a barrel of water, and give the leather one or two applications of this liquid. Then produce a black on the seasoned leather by mixing 12 lb. of sulphate of iron and $1\frac{1}{2}$ pints of sumach well boiled and left to settle. After blacking hang up to dry.

A Paste for Satin Hides is made thus:—

Ingredients.—8 lb. flour.

$\frac{1}{2}$ lb. gelatine.

$\frac{1}{2}$ lb. beeswax.

$\frac{1}{2}$ lb. tallow.

1 lb. soap.

1 quart lamp-black.

2 quarts strong logwood liquor (without soda).

2 quarts thick flax seed mucilage.

water to make 8 gallons.

Method of Preparation.—Mix flour and water until perfectly smooth, and then add the other ingredients, boiling one half-hour, stirring frequently while boiling.

Finish for Satin Hide.

Method of Preparation.—When dry roll them in paste again, and give them a coat of the following mixture:—

9 lb. blood albumen dissolved in

6 gallons water.

Four gallons of flax seed solution are made from 4 lb. of seed by boiling the seed in 4 gallons of water for five or ten minutes and straining. Discard the seed, and use the remaining mixture. Boil 1 lb. of Irish moss in three gallons of water for fifteen minutes, strain, and use liquid in mixture; 12 gallons of strong logwood liquor, 5 oz. bichromate of

potash dissolved in 2 quarts of water, a solution of gum tragacanth, making 24 gallons of the whole mixture. Mix well, strain and add 2 quarts of liquid ammonia, when the mixture is ready for use. The above will make about 50 gallons. After giving a coat of the mixture, hang and let dry thoroughly, roll, and they are finished.

Stuffing for Dongola Leather.—For every 100 lb. of leather take—

10 lb. American wool grease.
5 lb. tallow, and
5 lb. cod oil.

Method of Preparation.—Heat the stuffing wheel to 110° F., and the stuffing to 120° F.; run for half an hour.

Seasoning for Dongola Leather.

Method of Preparation.—Put 3 parts of logwood chips in a coarse bag, and suspend it in a 50 gallon barrel about half full of water, add 6 lb. sal soda, and boil with steam for two hours. Condensed steam will nearly fill the barrel. If not full add water, then add 1½ pints of liquid ammonia, and use while warm (140° F.). Apply with a medium stiff brush, then wash with cold water, and slick off.

Blacking for Dongola Leather.

Ingredients.—23 lb. sulphate of iron.
7 lb. sulphate of copper.
3½ lb. sal ammonia.
50 gallons water.

Method of Use.—Give alternate coatings of a logwood seasoning, and then this black, finally after slicking give a slight smear of cod oil. Hang up to harden a little, then slick them firmly on flesh, and hang up to dry. When dry strike them by machine until soft. Then give them a coat of the following compound:—

1 lb. beeswax.

1 lb. lard.

4 lb. paraffin oil.

Melt together, use this warm (110° F.). When this mixture has struck in, wipe them with a soft cloth, and roll in machine, then give them a coat of flax seed, hang up and dry, then roll them and they are finished.

Seasoning Blacks for Levant Goat.

Method of Use.—The logwood liquor is prepared by boiling 1 cwt. of logwood chips with a little soda in sufficient water to produce a purple colour. This liquor is well brushed into the skins until they assume a dark purple colour. Then lay on the black, which is prepared from 3 quarts of stale malt liquor, 3 quarts of water, 6 oz. of sulphate of iron, and 1 oz. of sulphate of copper. After applying this hang up in a hot stove, dry out, draw through a tray of cold water, allow them to get firm, wet grain same as colours, dry out, and fluff on fine emery wheel.

The Seasoning for Levant Goat is prepared from

3 quarts logwood.

3 quarts water.

10 fluid oz. bullock's blood.

10 fluid oz. milk.

2½ fluid oz. liquid ammonia.

5 fluid oz. orchil.

Method of Use.—This is well brushed into the grain, when the skins are hung up to dry in a warm stove till fit for glazing. After glazing, oil off with linseed or half linseed and mineral oils.

Blacking for Waxed Upper Leathers.

Ingredients.—30 lb. good tallow.

12 lb. crude potash.

1 lb. logwood extract.

20 gallons water.

Method of Preparation.—Boil all together for one hour, carefully add 6 lb. of lamp-black, and stir and boil for another hour, then add 6 gallons of tan liquor of about 14° strength (by barkometer), and 5 gallons of vinegar or sour beer. Stir as the mixture cools, adding sufficient water to make up 52 gallons.

Paste for Wax Calf and Splits.

Method of Preparation.—Beat up 6 quarts of flour into 2 gallons of water, add 5 lb. mutton tallow, 6 oz. beeswax, 6 oz. dry resin. Add these materials to 6 gallons of water, stirring in 1 lb. of glue in solution. Boil gently for fifteen minutes, and put in 12 oz. of finely sliced Castile soap, taking care that the boiling is not stopped before the introduction of the soap. When cool apply in the usual way. As a finish for the above use $\frac{1}{4}$ oz. of above paste and $\frac{3}{4}$ oz. gum dragon of the consistency of heavy cream.

Preparation of Blood Albumen.—Cut up the coagulated blood into cubes of about 1 inch size, and allow them to drain on sieves for forty to forty-eight hours, and after the clear fluid is separated from the red sediment, draw off this clear sediment into wooden vats. This serum is then used for the preparation of *natural* and *patent* albumen; the first has no gloss, and the latter has a gloss.

To make Natural Albumen.

Method of Preparation.—Mix 1 part of turpentine with 40 parts of serum, and agitate them for one hour in a suitable churning or whisking machine. The action of the turpentine is to bleach the serum, and also to withdraw mucous fat from the serum and act as a preservative. Then allow the mixture to stand undisturbed for from twenty-four to thirty-six hours, and draw off the clear serum from the sediment; then dry the serum in iron cups coated with oil paint and lacquer burnt in. These cups should be about 12 inches long.

6 inches wide, and $\frac{1}{4}$ inch deep. The temperature of the drying room should be about 122° F., and be gradually raised for two hours to 125° F. to 130° F. It is then lowered to 100° F. to 105° F., and kept there for thirty-four hours, when the drying is finished.

To Prepare Patent Albumen.—Mix together

5000 parts serum,
12 parts sulphuric acid,
22 parts concentrated acetic acid,
336 parts water,

and to the mixture add $\frac{1}{4}$ part of turpentine, and agitate for one hour, then give twenty-four to thirty-six hours' rest, when the clear serum should be drawn off, neutralised with ammonia, and dried as above.

Caseine is a product that is being extensively used in the preparation of a finishing gloss for aniline-dyed skins, etc.

To Prepare Caseine from Milk proceed as follows: Skim some fresh milk so that not a trace of cream remains, then allow it to curdle by letting it stand in a warm place, then collect the curdled milk on a filter paper, and wash the caseine by pouring soft water on it until the latter shows no trace of free acid. To remove the last traces of free acid tie the caseine in a cloth, and boil it in water, then spread it out upon clean new blotting-paper, and let it dry gradually in a warm place, when it will shrink up to a horn-like mass. Caseine thus prepared can be kept an indefinite time. Caseine from cheese is quoted at 40s. a ton.

